PACKAGE engineering

Shipping potatoes in corrugated boxes

What an agricultural expert learned about box performance, together with his recommendations about board, flutes, loading, ventilation, package costs, and results of shipping tests. (See Page 39)

The knack of putting labels on tiny bottles

Applying a pressure-sensitive label to a precise area on a miniature bottle takes a combination of machinery for label spotting and manual techniques for completing the job. (See Page 44)

How do you tell what's in a lamination?

Simple, systematic methods of analyzing a piece of laminated packaging material to identify its components—including specific tests plus helpful pointers in using them. (See Page 78)

In this issue—

Program of the AMA National Packaging Conference and list of exhibitors at the National Packaging Exposition **Starting on Page 55**

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APRIL 1959

VOLUME 4 • NUMBER 4

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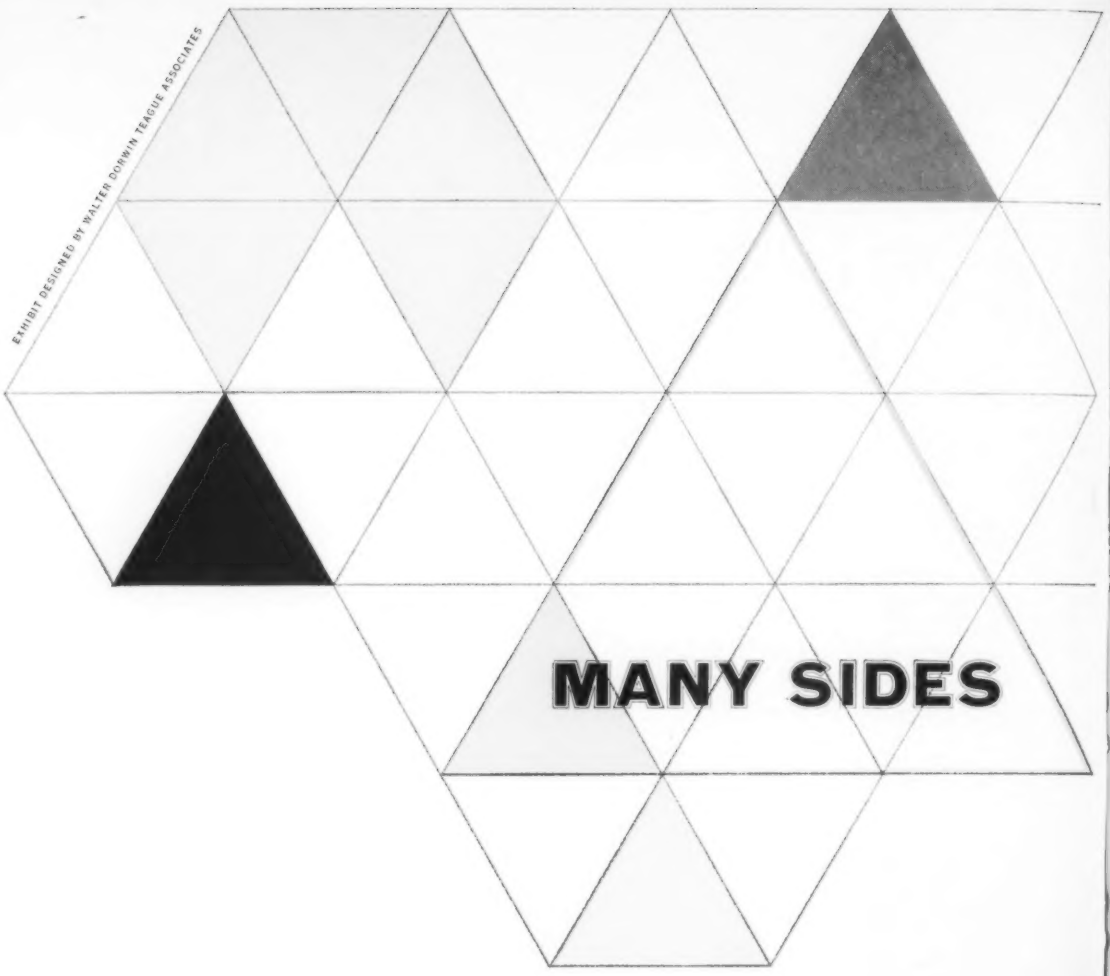

Questions: Can you use high density polyethylene in your packaging operations? If so, who should be your supplier?

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PACKAGE engineering

AN ANGUS J. RAY PUBLICATION

For your calendar

March 31-April 1-2. Annual meeting of the Research & Development Associates, Hotel Statler, Washington, D.C. Contact: Col. Rohland A. Isker, secretary, Research & Development Associates, Food and Container Institute, 1819 W. Pershing Road, Chicago 9, Illinois. *Telephone: Lafayette 3-5500, Ext. 4262.*

April 13-15. AMA National Packaging Conference, Palmer House, Chicago. Contact: Mr. John L. Wood, American Management Association, 1515 Broadway, New York 36, New York. *Telephone: Judson 6-8100.*

April 13-17. 28th AMA National Packaging Show, Chicago International Amphitheatre, Chicago, Illinois. Contact: Mr. John L. Wood, American Management Association, 1515 Broadway, New York 36, New York. *Telephone: Judson 6-8100.*

April 21-28. Europak 1959, the 5th International Packaging Exhibition, Amsterdam, Holland. Contact: Public Relations Bureau Beachez, Nassau Ouwerkerkstraat 14s-Gravenhage. *Telephone: K 1700-723895.*

May 17-21. Annual meeting of the Institute of Food Technologists, Bellevue-Stratford Hotel, Philadelphia, Pa. Contact: Col. C. S. Lawrence, Institute of Food Technologists, 176 West Adams Street, Chicago 3, Illinois. *Telephone: Andover 3-6268.*

May 31-June 13. Packaging Training Conference, Industrial Management Center, The Lake Placid Club, Essex County, New York. Contact: Mr. James R. Bright, Director, Industrial Management Center, 56 Robbins Road, Lexington, Mass. *Telephone: VO 2-4355.*

November 16-18. 21st Annual National Packaging Forum of Packaging Institute, Hotel Statler, New York, N. Y. Contact: Mr. Charles A. Feld, executive director, Packaging Institute, 342 Madison Avenue, New York 17, N.Y. *Telephone: Murray Hill 7-8875.*

Nov. 17-20. Packaging Machinery Manufacturers Institute Show, New York Coliseum, New York. Contact: Hanson & Shea, Inc., One Gateway Center, Pittsburgh 22, Pa. *Telephone: Atlantic 1-8552.*

Articles

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Research findings about board, flutes, loading, ventilation, costs and shipping tests suggest bright future for corrugated boxes.

44 Labeling bottles almost too small to hold, by Herbert J. Oglesby, packaging manager, Abbott Laboratories
It takes a combination of machine spotting of pressure-sensitive labels plus manual techniques to secure them in place.

48 Cushioning of packaged items, by John A. Hoffman, chief, customer acceptance laboratories, research and development, Kimberly-Clark Corporation
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55 Handy pull-out guide to AMA National Packaging Exposition and National Packaging Conference
Listing the exhibitors, their hotel headquarters, hotel locations, plus complete program of AMA National Packaging Conference.

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Solving production line and package performance problems of corrosive chemicals (and those sensitive to atmosphere) with a "crown-and-cap" combination.

78 Identifying the components of a packaging lamination, by Carl L. Brickman, manager, product testing laboratory, Standard Packaging Corporation
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93 Practical steps to an effective pacakge, by Charles F. Stuart, package engineer, Lyon Metal Products, Inc.
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Reader Service Card inside back cover

Our December 1959 issue will carry a cumulative editorial index for the year listing our feature articles by subject, author, and other headings.

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Associate Editor

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Laurence V. Burton
Contributing Editor

Anne Bernhard
Business Manager and
Circulation Director

Burton Cherry
Art Director

Executive and editorial offices:
185 North Wabash Avenue
Chicago 1, Illinois
Telephone: Financial 6-1440

Eastern Advertising Sales Offices:
Irwin F. Megargee
National Bank Building
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Telephone: EXport 9-3519

Arnold Gieseler
299 Madison Avenue
New York 17, New York
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A note from the Publisher

Advertising helps you

Inasmuch as the type and quality of the editorial content of a magazine determines its audience and the measure of acceptance it will enjoy in its field, great effort is spent to keep the editorial content of PACKAGE ENGINEERING informative, objective and stimulating.

It is our aim, also, to keep our advertising pages geared to the needs of our readers because we believe that the advertising pages of a business magazine constitute another important source of information.

In order to get the maximum value out of your copy of PACKAGE ENGINEERING, go through the magazine each month and read the ads that pertain to your business responsibilities and your company's packaging problems. Many ads contain information that can not be found elsewhere, and should be clipped and filed for your future reference. While editorial features are indexed by us in our December issue each year, and by Engineering Index, also, there is no way to locate some of the technical information that appears in our advertising pages other than a page-by-page search.

We are proud to note that this issue, which is the largest we have ever published, carries advertisements of more than 90 different products and services. Let the ads in this issue and our March issue serve as a guide to the National Packaging Show, which is being held in Chicago later this month, and which is described elsewhere in this issue.

The list of exhibitors that appears on the tinted stock in the center spread is a long one, and it would be impossible to explore thoroughly every exhibit there is. Why not go through the exhibitors' list, check off those you want to see in particular, then refer to the advertisers index in this issue and in our March issue. Many of those you are interested in will have ads that will give you more information about them. Then try the reverse. Check the ads against the exhibitors' list to see if companies that you are interested in are exhibiting. Remove this listing and take it with you to the show. You will find the hotel headquarters information on each exhibitor extremely helpful in locating people quickly and easily if you miss them at the show.

Planning the show before you get there will make it a much more profitable and more enjoyable experience.

Angus J. Ray

Publisher

Package Engineering is published monthly by Angus J. Ray Publishing Co., 185 North Wabash Avenue, Chicago 1, Illinois. Angus J. Ray, president; R. B. Holmgren and I. F. Megargee, vice presidents; James G. Culbertson, secretary and Ethyl K. Ray, treasurer. Please address articles for publication and correspondence regarding the editorial content to the editor. Statements and opinions expressed in articles and editorials are those of the respective authors, for which Package Engineering assumes no responsibility. Copyright 1959 by Angus J. Ray Publishing Company. The name Package Engineering is registered in the U. S. Patent Office.

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And, nothing compares with cellophane for complete protection against dust and moisture, and sealing *in* freshness. This means longer shelf life.

Distributors also prefer cellophane bundling because it wins favor with their retailers. Bundles can often be used as shelf displays without unwrapping until old stock is gone. This assures fresh, clean merchandise.

All these advantages mean savings in time and money for your own distribution organization and your wholesalers. They also give you and your wholesalers an extra selling tool.

But that's not all. In your own plant you can save bundling dollars with Avisco cellophane. It eliminates the need for printed or labeled boxes and paper overwraps; sails through your packaging machines more efficiently; seals easier and more securely—with heat alone. This heat sealing combined with cellophane's strength and rigidity result in a strong, secure, neatly formed bundle. What's more, cellophane substantially reduces packaging material inventory and the storage space it requires.

We offer a complete packaging service to assist you, and demonstrate how Avisco cellophane, plain or printed, will answer your bundling requirements better and more economically than any other material. Phone or write us for an appointment with our representative in your area or a selected cellophane converter specializing in your field.

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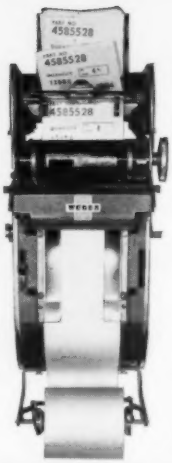

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Letters to PACKAGE engineering

Re: Quality control

Gentlemen:

Some time ago one of your readers wrote lamenting the fact that emphasis in training courses in statistical quality control and elsewhere seemed to be on problems involving "nuts and bolts" with little to be said about packaging problems. He wanted to know what could be done about it.

Certainly persons in other fields of quality control would like to be helpful, but not knowing the many facets of the problems in packaging, they can talk only in terms of generalities. It is up to packaging people themselves to work out applications of statistical procedures and thus build up a body of knowledge.

Progress can obviously be hastened if there is an exchange of ideas, and this is the reason for the existence of the professional organization of quality control people, the American Society for Quality Control. The society welcomes into its membership all persons in the packaging field interested in modern quality control procedures, and will no doubt be glad to have them organize a packaging technical committee within the society if there is sufficient interest.

Your recent series of articles on "A practical approach to a weight control program" is a distinct contribution to a literature which frequently points out that something ought to be done but seldom has much to say on how it should be done.

My remarks are prompted by the early experience I had in getting a statistical quality control program started in a new field. Up to that time there had been some articles published in industry trade journals on the benefits

(Continued on Page 10)

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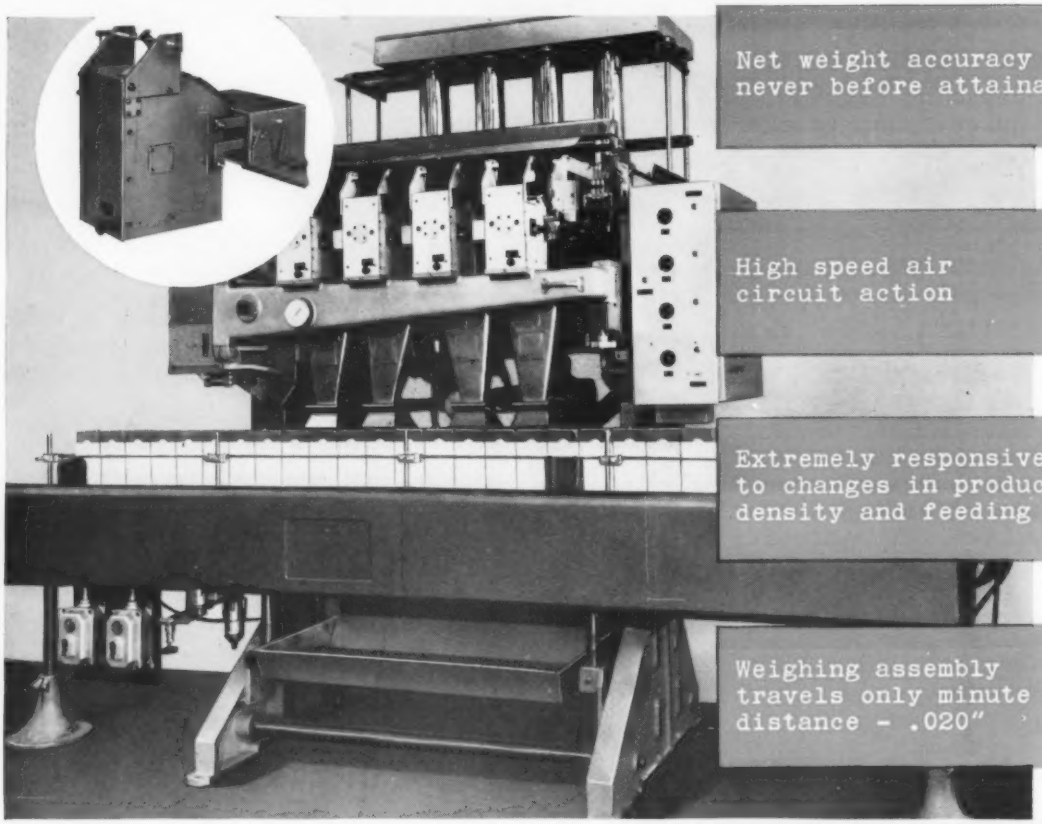

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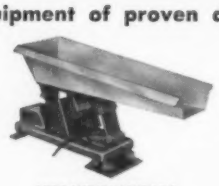

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to be gained from a statistical program, and the subject was discussed at industry meetings, but little was said as to actual procedures to be followed. I found it very helpful, therefore, to compare notes first hand with others working on similar problems.

It was a matter of inconvenience to make special trips to other plants, so a proposal was made to four or five that we meet in some central location for an extended round-table session. Quite a bit of interest in the proposed meeting developed in the industry with the result that representatives from 27 companies met for a two-day conference in Chicago.

To continue the contacts thus established, the group formed a permanent organization which subsequently became a part of the American Society for Quality Control and is now known as the brewing (industry) technical committee.

It would seem that similar close liaison of quality control people in the packaging field would be beneficial to the industry. If any individuals feel that they would like to explore the idea, I would be more than willing to pass on what experience I can.

Brant Bonner
Staff Supervisor
Statistical Quality Control
The Dow Chemical Company
Midland Division
Midland, Michigan

More power to Reader Bonner, who is national membership chairman of American Society for Quality Control. Let's hear from you package quality control experts. What do you think of Mr. Bonner's suggestions?

Have you questions about any of our articles? Functional packaging problems which other readers might help you solve? Comments on topics of current packaging interest? Write (on your letterhead) to:

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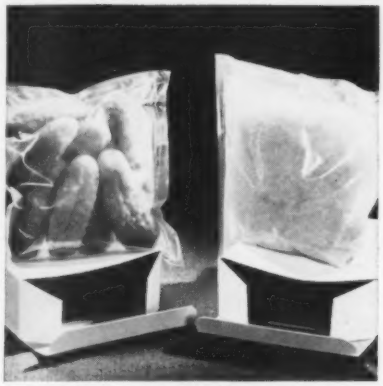

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VACUUM-PACKED foods stay vacuum-packed in "Scotchpak"! Film has low permeability to air, other gasses and water vapor. Cuts packaging and shipping costs.

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MINNESOTA MINING AND MANUFACTURING COMPANY
. . . WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

The PULSE / of packaging

Trends to watch:

Cellophane sales reached new heights during 1958 according to its producers who note that "most significant" market development during the year was the growth of polymer-coated films. Cellophane makers also say that the addition of about 100,000,000 lb. (annually) of new productive capacity eliminates threats of shortages . . . Collapsible metal tube manufacturers had another billion-unit year in 1958—fourth in the 118-year history of the industry, according to **Collapsible Tube Manufacturers' Council,** reporting a gain of 6.5 per cent for December as compared to 1957. The Council attributes the year's 8.5 decline over 1957 to general business conditions and the initial impact of aerosol containers for dentifrices. It predicts 1959 shipments should run well ahead of 1958 . . . Meanwhile aerosol packers look to new applications. **G. Barr and Co.** predicts that push button containers may eventually replace hypodermic needles as a means of carrying drugs to the blood stream. Technical advances spurring increased use of pressure-packaged drugs include the use of nitrogen as a propellent, say pressure package advocates . . . **American Can Co.** says aluminum cans "have arrived", plans to commit increasingly greater research funds on the gamble that the price of aluminum will be reduced enough to make aluminum cans competitive with tin plate cans. Noting that aluminum sheet has dropped in price to where it approaches tin plate on a gauge-for-gauge-basis, Canco's experts predict that aluminum will find its first use in cans for products not requiring thermal process and where aluminum can replace tin plate of the same gauge . . . Another aluminum can note: **Kaiser Aluminum & Chemical Corp.** says its deep-drawn aluminum cans are being used for synthetic-base lubricating oil for jet engines of U. S. Navy air craft. Deep-drawing eliminates side and bottom double seams, permits a two-thirds weight saving over previously used conventional containers, Kaiser says . . . A strong surge in January sales of reinforced plastics is forcing upward revision of predicted gains for these materials in 1959, according to the **Reinforced Plastics Div.** of **The Society of the Plastics Industry, Inc.** It predicts a 15 per cent rise during 1959 . . . Looking at the short skirt crown (introduced less than three years ago), **Bond Crown & Cork Div., Continental Can Co., Inc.,** says the short skirt accounted for 46 per cent of its sales to soft-drink bottlers in 1958, compared to six per cent in 1956. Its shell is 1/32 in. shorter than the standard crown, but has same overall diam. . . . Noting the current interest in heavy duty polyethylene shipping bags, **National Flexible Packaging Association** warns against misapplications due to inadequate information, notes that drop tests alone may not be adequate determinants of resistance to shock and puncture. NFPA says shipping and storage tests and findings of gas and water-vapor transmission rates for particular products are necessary, plans to ask **The Society of the Plastics Industry** to widen the scope of its standard to include gauges over the present six-mil limit and possibly as high as 20 mil in graduated steps . . . It appears that **Society of Packaging & Handling Engineers** and **American Material Handling Society** will merge. Both boards have approved in principle recommendations for merger, and legal studies of details are now under way.

Packaging across the seas:

Sponsors of **Europak 1959,** noting the interlocking of economic interests and the setting up of the European common market, term it "essential" that the different countries reach agreement to exchange information which can result in improved design and construction of packages. Observing the lack of time to visit more than 20 fairs all over Europe, they say there is a definite shift toward the more specialized fairs in Amsterdam, Düsseldorf, London, Padua and Paris. **European Packaging Federation** says that there is now closer contact between the packaging institutes in the different countries in that there is a trend to cooperate on an international rather than a national level for the exchange of information.

Notes from the government:

James Palmer Whitlock, Jones & Laughlin Steel Corp., is now assistant director of the Containers and Packaging Div. of the Business and Defense Services Administration, U. S. Department of Commerce. He succeeds **John G. Kain,** who is returning to the Star Box & Printing Co., Chattanooga . . . New commandant of the Quartermaster Food & Container Institute for the Armed Forces, Chicago, is **Col. James P. Littlejohn.** He succeeds **Col. Ervin L. Keener,** who is now deputy commander, Utah General Depot, Ogden . . . **Commodity Standards Div., Office of Technical Services, U. S. Department of Commerce** is now offering its recommended commercial standard for polyethylene film, TS-5438, proposed by the Society of the Plastics Industry, Inc., and adjusted by the division in accord with comment from other interests. The division is seeking acceptances of the standard by producers, distributors, and users of polyethylene film . . . **U. S. Forest Products Laboratory** has an expanded program of graduate study in research in six fields (one of which is packaging), offered by the Univ. of Wisconsin during the academic year starting in Sept. The FPL is maintained at Madison, Wis., in cooperation with the university. The program includes paid research fellowships and assistantships to candidates for M.S. and Ph.D. degrees, according to Dr. J. A. Hall, FPL director.

More expansion for packaging:

Rexall Drug Co. is acquiring **Chippewa Plastics, Inc.,** to operate as an independent division with headquarters continuing at Chippewa Falls, Wis. . . . **Carney Associates** is a new consultation firm established at Chicago by C. J. Carney, Jr., long-time managing director of Society of Packaging and Handling Engineers . . . **Diamond Gardner Corp.** is acquiring **Hoosier Containers, Inc.,** plans to merge it with **Gardner Container,** change its name to **Diamond Hoosier Containers, Inc.** . . . **Plastic Papers, Inc.** has a new 27,000 sq. ft. polyethylene coating plant at Hicksville, N. Y. . . . **American Viscose Corp.** and **Sun Oil Co.** have formed an equally owned affiliate, **AviSun Corp.,** scheduled to be a commercial supplier of polypropylene by mid-summer. It expects to have commercial quantities of polypropylene resin available from leased facilities of the Port Reading, N. J., linear polyethylene plant of **Koppers Co., Inc.** Annual capacity is estimated at 20,000,000 lb/yr. . . . **Henry B. Katz Industries, Inc.,** has purchased **Lawrence Packaging Supply Co.,** Newark, N. J., maker of military and commercial packaging supplies . . . **Ball Brothers Co., Inc.,** announces plans for a 40,000 sq. ft. manu-

SONOWELD® Ultrasonic Seam Welder, ✻ on display and in operation at the **ALCOA Booth,** No. 621, A. M. A. Packaging Exposition April 13-17, in Chicago.

✻ Capable of making hermetic seals on foil structures. SONOWELD Equipment by Sonobond Corp., a subsidiary of Aeroprojects, Inc., West Chester, Pa.

BETTER PACKAGING ALCOA WRAP ALUMINUM COMPANY OF AMERICA

facturing building and 120,000 sq. ft. warehouse at Asheville, N. C. . . . **Extrudo-Film Corp.** has started building its second plant, a 50,000 sq. ft. facility at Pottsville, Penna., to produce extruded polyethylene film, sheet and tubing . . . **The Dow Chemical Co.** is now operating a full scale production plant for its Trycite polystyrene film at Cleveland . . . **Armstrong Cork Co.'s** Millville, N. J., glass plant will get a new 86,000 sq. ft. warehouse, bringing the plant's total warehouse space to 210,000 sq. ft. . . . The Plastics Div. of **Nopco Chemical Co.** has started construction at N. Arlington, N. J., that will triple the size of its present plant making polyurethane flexible foams. . . . **Thatcher Glass Manufacturing Co., Inc.,** plans to acquire the **Celon Co.,** Muscatine, Ia., maker of cellulose seals and plastic closures . . . **St. Regis Paper Co.** and **Monsanto Chemical Co.** announce formation of **Fome-Cor Corp.,** a jointly-owned company to produce Fome-Cor, a foamed plastic and paper "sandwich" material for containers and other applications . . . **Personal Products Corp.,** Milltown, N. J., has acquired the **Stonebridge Paper Co.,** Wilmington, Ill., cellulose wadding producer . . . **Research Molding & Film Co.,** Menden, Mich., is starting production as an extruder of conventional polyethylene. It plans to process polypropylene, nylon and high-density polyethylene . . . **Monsanto Chemical Co.** says that the production capacity of its high-pressure polyethylene plastics facilities at Texas City, Tex., will be increased to 100,000,000 lb/yr. . . . **Bennett Industries, Inc.,** Peotone, Ill., steel pail and drum maker, is now producing fibre drums . . . **Mobay Chemical Co.** plans a 50 per cent expansion of its production capacity for tolylene diisocyanate (TDI), one of the basic chemicals used in producing urethane foam cushioning and insulating materials . . . **U. S. Printing & Lithograph Co.** is acquiring **Brett Lithographing Co.,** N. Y. . . . **Avery Adhesive Label Corp.,** Monrovia, Calif., and **Fasson, Inc.,** Plainesville, Ohio, have combined as one corporation under the name **Avery Adhesive Products, Inc.** Each will continue to operate as a separate division of the corporation under the names **Avery Label Co.** and **Fasson Products,** respectively . . . **IMCO Container Corp.** has a new plant at Harrisonburg, Va., plans to start plastic bottle production, including hot stamp or silk screen printing . . . **Custom Merchandise Corp.,** Brooklyn, has organized to manufacture thermo-formed products and the vacuum forming of blisters for packaging.

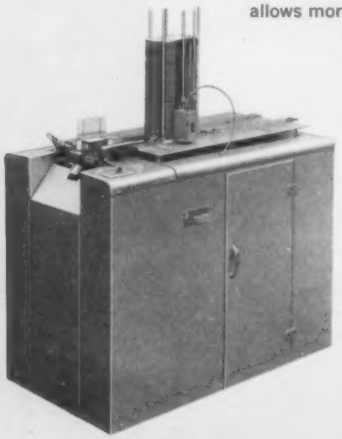
Packaging dollars and cents:

National Starch Products, Inc., reports net sales for 1958 of $46,200,145, compared with $43,745,779 for 1957. The increase is primarily attributed to expanded volume in new and established products. Its net earnings after taxes were $3,130,667 for 1958, compared with $2,676,535 for 1957 . . . **Interchemical Corp.** says its sales last year aggregated $109,489,000, compared to $109,846,868 in 1957. Net earnings for 1958 were $4,684,000, as against $3,924,731 . . . A cost reduction program and a recovery of sales during the second half accounted for the increase, according to Interchemical . . . Total net sales of **Diamond Gardner Corp.** for 1958 were $168,808,000, compared with $170,645,000 in 1957, and net income (according to preliminary figures) totaled $7,370,000 as against $8,129,000 the previous year. The general business recession, non-recurring start-up expenses at its new Red Bluff, Calif. plant, and depressed lumber markets affected the company's earnings adversely, it reports . . . **Knox Glass, Inc.,** reports for the quarter ended Dec. 31, 1958, net sales of $9,130,810, as against $8,494,710 for the same quarter of 1957. Net income for the last quarter of 1958 was $185,013, compared to $279,032 for the last quarter of 1957—which includes non-recurring income of $136,663 . . . **American Can Co.** reports sales for 1958 of $1,037,032,365, com-

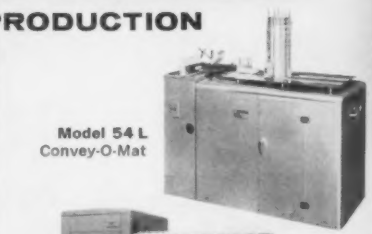
TUCK-O-MAT LINE *by...* **BIVANS**

FOR SHORT RUNS OR CONTINUOUS PRODUCTION

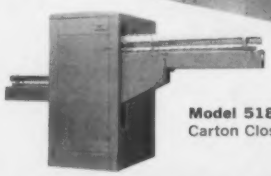
The TUCK-O-MAT Model 50 is a reliable, general purpose carton set-up machine...a real workhorse of the cartoning line. Hundreds of installations prove that it offers more versatility, handles a wider range of carton sizes, allows more adaptations...all at speeds up to 75 cartons per minute.



BIVANS will out-perform, out-last any comparable equipment on the market today. Write today for complete details or a demonstration.



Model 54 L
Convey-O-Mat



Model 518 L
Carton Closer

Call our distributor today to see a Bivans installation near your own plant.

BIVANS CORPORATION

2431 Dallas Street, Los Angeles 31, California

Distributed by: New Jersey Machine Corp., Hoboken, Cincinnati, Chicago, Los Angeles

Molder: Worcester Molded Plastics, Worcester, Mass.

This 47-pound Royal Electric Typewriter gets shock-absorbent protection from 3½-pound DYLITE foam cocoon

Hard to believe? It's true! It's the first time that an electric typewriter has been packaged in a plastic material. The material: DYLITE expandable polystyrene. One of the key reasons behind the development of this pack is DYLITE's moldability. It can be molded to fit the intricate contours of any size or shape, thus holding movable parts firmly in place. The new DYLITE pack cuts shipping costs since it weighs only one-third as much as the old container; and its simplified design has reduced handling time four and a half minutes. DYLITE offers an entirely new concept in packaging with these five remarkable qualities: it is shock-absorbent, strong, water-resistant, lightweight and is an excellent insulator. If your product package requires these properties, then DYLITE is your answer. Plan now to try DYLITE in your next application. For more information, write to Koppers Company, Inc., Plastics Division, Dept. PG-49, Pittsburgh 19, Pennsylvania.

DYLENE *polystyrene,* SUPER DYLAN *polyethylene and* DYLAN *polyethylene are other fine plastics produced by Koppers Company.*

Offices in Principal Cities · In Canada: Dominion Anilines and Chemicals Ltd., Toronto, Ontario

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pared with $1,006,304,940 for 1957. Earnings in 1958 (after taxes) were $46,432,856, as against $42,169,139 in 1957. (Canco says the 1957 figures have been restated to reflect a retroactive provision for deferred income taxes on accelerated depreciation) . . . **Acme Steel Co.** says its consolidated net sales for 1958 (preliminary figures) were $128,797,000, compared to $147,748,561 for 1957. Net income for 1958 was $5,720,000, as against 1957 net income of $6,016,524 . . . Preliminary reports from **St. Regis Paper Co.** indicate its net sales for 1958 were $376,700,000, as against $376,800,000 in 1957. Final figures will show net income for 1958 slightly in excess of $21,000,000 (as against 1957 income of $21,800,000), according to St. Regis . . . **Jones & Laughlin Steel Corp.** reports 1958 sales and operating revenues of $654,060,000, as compared with $837,568,000 for 1957. Net income after taxes was $23,198,000 in 1958 and $45,452,000 in 1957. Noting a fourth-quarter improvement, J&L attributed this to sales increase and "a very substantial" increase in plant efficiency.

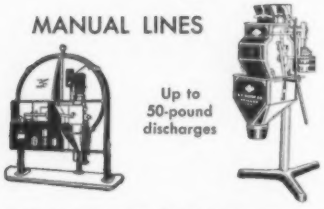
What people are doing:

Geo. A. Hormel & Co. has named **E. P. (Bert) Maus** assistant purchasing agent to take complete responsibility in packaging for the firm . . . **Adolph Miller** is now director of research and development of Milprint, Inc. . . . Specification Packaging Engineering Corp. has elected **Kenneth Brown,** consulting engineer, to its board of directors . . . **Paul F. Young, Jr.,** is now package engineer of the Cushioning Products Div., Armour & Co., Alliance, O. . . . R. A. Jones & Co., Inc. has named **Carl Claus** vice president; has named **Stan Thomson** assistant sales manager, functioning under **Ed Minneman,** vice president in charge of sales . . . **Ralph H. Martin** is now assistant to the president of Standard Packaging Corp. . . . **Seth R. Schneible** has been named manager of Aerosol Product Sales, Crown Cork & Seal Co., Inc. . . . Rieke Metal Products Corp. has named **Raymond F. Ouer** general manager in charge of sales, succeeding **Truman W. Floyd,** a Rieke vice president now on the executive committee and in charge of foreign sales . . . **R. G. Madill** is now eastern district sales manager for Commercial Container Div., Ball Brothers Co. . . . **J. Stewart Campbell** is now manager of laboratory services; **Dr. Michael J. Curry** manager of the plastics research department; and **Dr. William J. Evers** manager of the newly created exploratory polymer research department, all of Celanese Corp. of America. Celanese has also named **David W. Chappuis** controller . . . **Ernest W. Schaw** and **Fitz L. Sargeant** are now vice presidents of Reynolds Metals Sales Co. . . . **William G. Reynolds** and **Joseph H. McConnell** have been named vice presidents of Reynolds Metals Co. . . . **Harry H. Balthaser** is now president of Fome-Cor . . . Potter Instrument Co., Inc., has named **Frederick O. Bischoff** production manager, and **Gerald Newberg** project engineer . . . **R. E. Hartig** has transferred to the product development unit of Bemis Bro. Bag Co.'s general sales department, St. Louis . . . Celluplastic Corp. has named **James L. McKenna** assistant sales manager and **Gus Johnson** field sales manager . . . Scandia Packaging Machinery Co. has promoted **Anthony J. DeSimone** from cost coordinator to controller . . . **Earl L. Wilson** is now sales manager for Jet-Pak bags, Columbian Rope Co. . . . Pfaudler Permutit Inc. has named **George C. Calvert** to supervise all Pfaudler Permutit western hemisphere operations outside of the U.S.; **A. W. Zoller** manager of domestic manufacturing operations; and **Thomas Griswold** manager of its Elyria plant . . . **Roy Carson** is now assistant to the president of Chippewa Plastics, Inc., and **Robert F. Hrudka** is sales manager and vice president . . . Thilmany Pulp & Paper Co. has named **Guy E. McCorison** president, succeeding **E. H. Jennings,** now chairman of the board. **H. O. Peters** is now vice president-sales . . . **Paul G. Kodeck**

Packagers of Dry Powdered, Granular or Crystalline Materials . . .

choose your equipment to suit the job

MANUAL LINES



Up to 50-pound discharges

BAR-NUN "Auto-Check" Net Weighers for discharges from ¼ oz. to 5 lbs. Guaranteed extreme accuracy stops costly overweights; fast, dependable operation.

Edtbauer-Duplex Net Weighers for discharges from 4 oz. to 50 lbs. Known for dependable, economical service. Accuracy well within commercial tolerances.

AUTOMATIC BAG PACKAGING

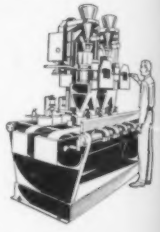
Feed, Open, Hold, Weigh-fill, and Eject Paper Bags

BAR-NUN Bag Feeders and Weighers

Take paper bags as they come from the bag manufacturer; eject them ready for closing equipment, at speeds up to 30 per minute. One operator can tend two Bar-Nuns. Pay for themselves through savings in labor and material. Guaranteed extreme weight accuracy.

AUTOMATIC CAN, JAR OR CARTON LINES

Feed, Fill, Pack and Eject up to 200 Containers per Minute



BAR-NUN "Auto-Check" Can Lines

Maintain heavy production schedules with minimum attention. Savings in material through guaranteed extreme accuracy and no-spill packing, plus labor savings and *packaging on schedule*, make a real reduction in production costs. For one-half or one-pound containers.

Write for recommendations on your packaging requirements, without obligation. Tell us the material, weight, type of container, and capacity required. Or, see our engineers—and Gump Packaging Equipment in operation—at the NATIONAL PACKAGING SHOW, BOOTHS 569-571.

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Paper Coated with SYL-OFF

lifts easily and cleanly from all sticky products

Here's a new, effective way to speed processing and handling of sticky products. How? By using packages or interleaving sheets coated with one of the new SYL-OFF* silicone paper coatings. SYL-OFF coatings speed handling, reduce product waste, provide a new selling advantage.

A SYL-OFF coating gives excellent anti-adhesive properties to paper and paperboard containers — from glassine to boxboard. Permits removal of all the product quickly, without sticking and tearing. Even the gummiest products won't adhere to a SYL-OFF coating. Of over 100 materials tested — including asphalt, candy, glue, adhesive, unvulcanized rubber — none was found to stick except a silicone adhesive!

If you process, stock, or ship sticky materials, a SYL-OFF coating will benefit you and your customer in time and money saved.

Even the stickiest pressure-sensitive adhesive film without a backing doesn't stick to interleaving packaging sheets coated with a SYL-OFF coating.

A SYL-OFF Coating Offers These Advantages

- Won't migrate, transfer, or contaminate.
- Doesn't alter papers' features.
- Costs little more, if any, than ordinary anti-adhesives.
- Lasts as long as the stock itself.
- Reduces shipping costs—lighter in weight than conventional coatings.
- Improves water repellency.

Write Dept. 5216 for free samples, full information, list of suppliers on request.

first in silicones

Dow Corning
CORPORATION
MIDLAND, MICHIGAN

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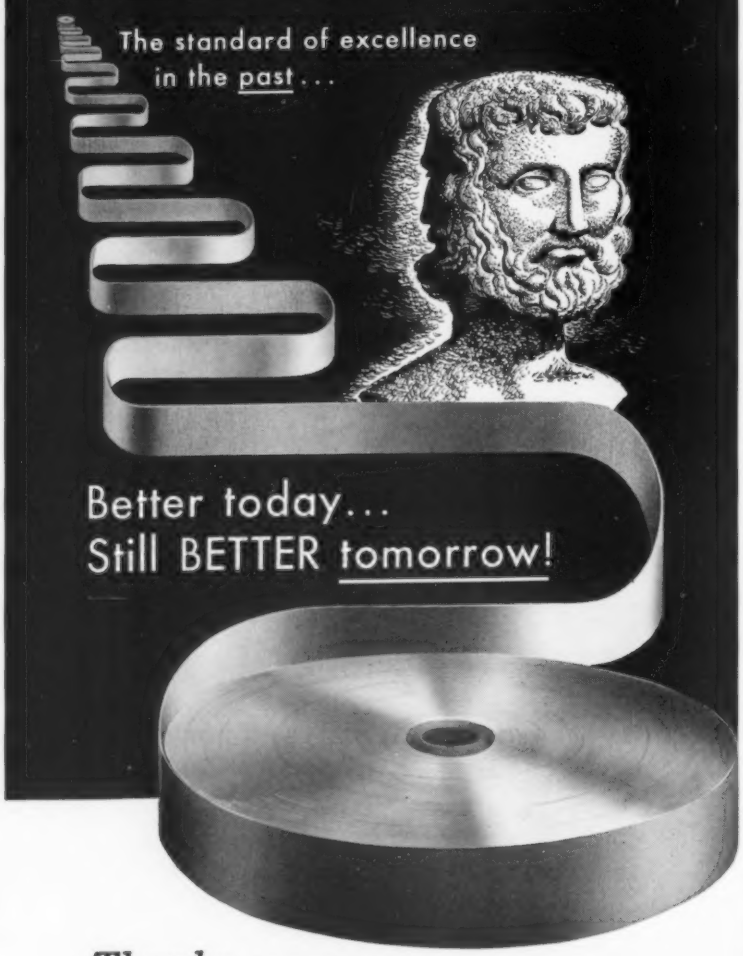
GUMMED TAPE WITH ANIMAL GLUE

The standard of excellence in the past . . .



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Still BETTER tomorrow!

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DARLING'S *Research for better glues*

DARLING'S *Technical Service, assisting the manufacturer of gummed tape*

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IF you have a packaging problem, see your gummed tape supplier.

DARLING'S improved BONE GLUE

DARLING & COMPANY
GLUE DIVISION
4201 South Ashland Avenue, Chicago 9, Illinois
Animal By-Products is Our Main Business

is now acting district sales manager (Omaha) for Hazel-Atlas Glass Div., Continental Can Co. **Oscar A. Tinker** is now chief engineer of fibre drums at Continental's Fibre Drum & Corrugated Box Div., Van Wert, O. . . . New vice presidents of Bemis Bro. Bag Co. include **T. H. Ashton,** director of central operations; **L. A. Linville,** director of western operations; and **H. J. Wehrenbrecht,** director of southern operations . . . **Alfred W. Arenander, Jr.** is now manager of trade relations (a new position) of West Virginia Pulp & Paper Co. **William F. Merrilees** succeeds him as purchasing agent . . . **Ray S. Richards** is now head of Owens-Illinois Glass Co.'s new section for metallurgical research and services . . . **N. W. Postweiler** is now special accounts manager, **William M. Riegel** eastern regional packaging manager, **Wilson W. Cross** product manager of packaging materials, and **John B. Shields** midwestern sales development manager for packaging materials, all of Riegel Paper Corp. . . . **Frank J. MacRae** is now manager of plastics technical service for The Dow Chemical Co., and **Fielding H. Yost, Jr.** is now assistant to the director of corporate relations of Dow . . . Stone Container Corp. has named **Alan Stone** director of marketing services . . . Federal Paper Board Co., Inc. has named **I. B. Foreman** superintendent, and **E. Burgenmaier** assistant superintendent, both at Federal's Washington, Penna. plant . . . **Albert F. Brunner** is now vice president in charge of sales for the Paperboard and Folding Carton Div., B. F. Nelson Manufacturing Co. . . . **Harold Holden** has been named president and general manager of Gilman Paper Co. He continues as a director of Standard Packaging Corp. and as a member of its executive committee . . . **John S. McClintock** is now director of marketing and sales of G. T. Schjeldahl Co. . . . Mead Containers, Inc. has named **William Connor** assistant general sales manager . . . Crown Zellerbach Corp. has named **Ernest V. Hardman** assistant product development manager; **Hutton W. Theller** program supervisor, plastics development; **Richard F. Dunbrook** assistant sales manager, specialty packaging; for Western-Waxide, St. Louis . . . **Dr. William Hoge** is now director of technical specialties development of Oxford Paper Co., and **Bernhard Mayer** is now assistant director of research . . . Container Corp. of America has named **Albert A. Austin** and **Jack D. Tovin** sales manager and assistant sales manager, respectively, of its Philadelphia and Valley Forge carton plants. **Arthur W. Tower** is now general sales manager, Fibre Can Div. of Sefton Fibre Can Co., a Container Corp. Div. **Joseph F. Kilcullen** is now manager of CCA's Specialty Div. (*End*)

For cheaper, more convenient

quality control

Coded product labels are useful in quality control, but they present problems. You run short of the required sizes, colors, etc... when you need them most, or they become obsolete and have to be scrapped. Or you have to maintain excessive inventories. But with a Tickometer, you imprint labels and light cartons as you need them — *with codes, colors, weights, sizes, dates, lot or formula numbers — at speeds from 400 to 1,000 per minute. And cut your label and package inventories, avoid the waste of unusable pre-printed items, save time and printing bills.*

- In many companies, the Tickometer pays its way when used as little as five minutes in the afternoon, to code labels or wrappers for the next day's production. Prints with exact register on most paper weights and finishes, light card stock, foils and plastics. Feeds and stacks automatically, is easy to set and use.
- The Tickometer also counts, gives you a check on output, shipments, orders, time cards, job tickets. *It's so accurate that banks use it to count currency!* Records partial amounts and totals, and can be set for a predetermined count. With optional accessories, it will sign or endorse checks, do consecutive numbering. Can be rented or bought. And PB service is nationwide, from 302 points.
- Call the nearest Pitney-Bowes office for a demonstration. Or send coupon for free illustrated booklet and case studies.

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Imprinting & Counting Machine

Made by the originator of the postage meter ... offices in 121 cities in U.S. and Canada.

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Send free Tickometer booklet and case studies

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Film of **TENITE POLYETHYLENE**

makes strong, sparkling-clear bags

Tenite Polyethylene bag extruded, printed and fabricated by Texas Plastics, Inc., Elsa, Texas, for Spada Fruit Sales Agency, Inc., Tampa, Florida, packers of "PeeDeeCo" brand oranges.

The clarity and sparkle of Tenite Polyethylene film enhance the appearance of the product it protects. Food, clothes, hardware, toys . . . look fresher, keep cleaner and sell easier . . . when packaged in film extruded from Tenite Polyethylene plastic.

When used to package oranges, for example, these sparkling bags provide many sales-producing advantages. From packer to purchaser, they display the fruit attractively while protecting against dirt, dust and handling damage. Here, the excellent printability of the film permits full-color reproduction of the old-style mesh bag, a tempting glass of orange juice and the company brand. For packaging other products, the directions for use, product advantages, ingredients or other information can be printed on the film.

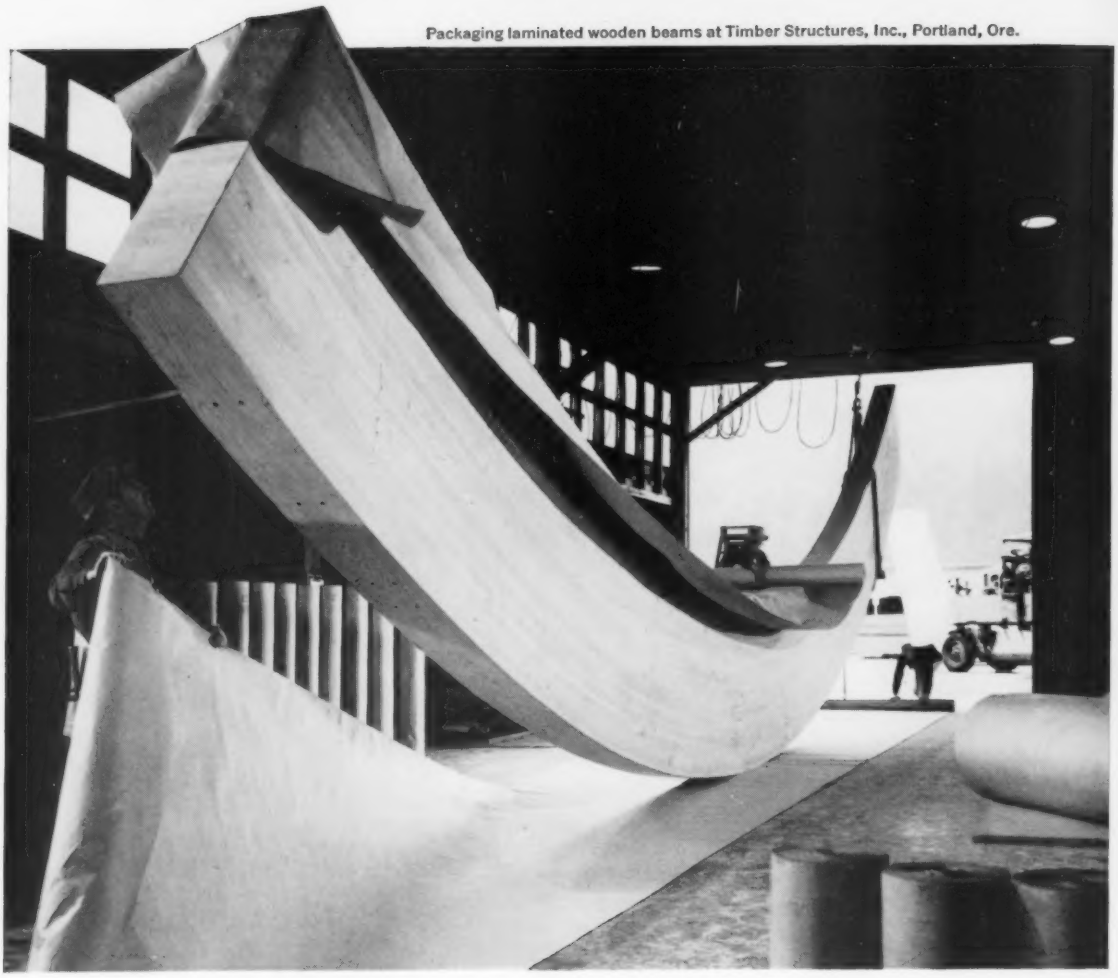
While the strength of this Tenite Polyethylene film qualifies it for bagging heavy items such as oranges, its toughness in slightly thicker gauges also makes it a logical material for packaging pointed or sharp-cornered articles such as dime-store quantities of nails, screws, toy blocks and similar products.

In bagging candy, chemicals or baked goods, the moisture resistance of this versatile plastic film means added protection against product deterioration.

Film of Tenite Polyethylene appeals to packaging men who need a material that meets a broad range of specifications. It has excellent resistance to puncture and doesn't tear easily. It has remarkable clarity and gloss. It is tough, inert, waterproof, printable, heat-sealable and . . . economical. Why not let us help you explore the possible usefulness of this versatile plastic in your packaging plans. For more information, write EASTMAN CHEMICAL PRODUCTS, INC., subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE.

TENITE
POLYETHYLENE
an Eastman plastic

Packaging laminated wooden beams at Timber Structures, Inc., Portland, Ore.



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keep your Packaging Costs "On the Beam"

You don't have to be a manufacturer of construction beams to be able to cut packaging costs through the use of Sisalkraft flexible wraps. If your goods require protection from damage by water, moisture, dust, dirt, staining or rough handling, chances are we have or can design a durable wrap to do the job without "over-packaging".

Sisalkraft products are made by laminating together any number of materials to form a protective sheet. We can combine paper with paper, foil with foil, plastic film with plastic film or any mix of these. In addition, these combinations can be reinforced with amazingly tough fibers for extra strength, if needed.

If you would ask your shipping room head to write us, we will send information to prove how these products can cut costs for your firm. No obligation, of course. Please write c/o our main offices at Attleboro, Massachusetts.

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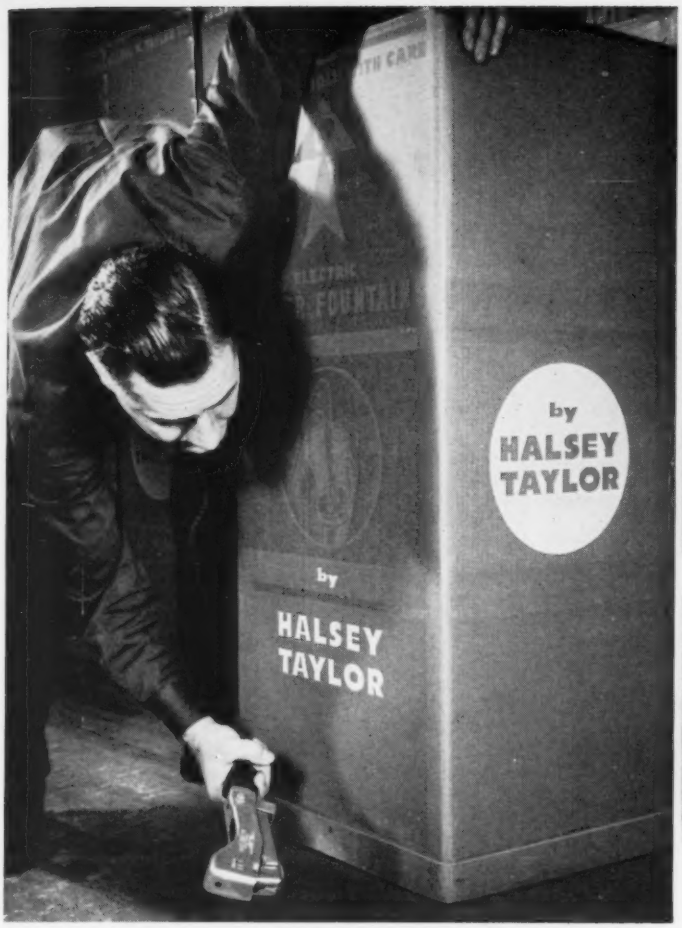
reinforced paper, foil and plastics for construction, industrial packaging and agriculture



Packer staples carton to wooden pallet with Bostitch H4 Stapling Hammer. Staple legs diverge inside wood. Staples are coated to increase holding power 65%.

Bostitch Air-Driven Stapler securely seals top flaps from outside. Entire packing operation takes one minute with Bostitch stapling.

Bostitch stapling helps slash shipping costs— results in improved container

A water fountain manufacturer demonstrates the point. Corrugated cartons—Bostitch stapled—replaced nailed wooden cases. Packing speed leaped from one unit in five minutes to a unit a minute. Damage claims dropped about 55%. Container weight went down by 18 to 20 pounds. New container is easier to handle and takes much less storage space because it is 1900 cubic inches smaller.

Perhaps there are opportunities for savings and benefits like these in your shipping room. If so, a Bostitch Economy Man will help you find them. Over 300 of these cost-cutting specialists work out of 123 U.S. and Canadian cities. Yours is listed under "Bostitch" in the phone book. Call him in for a no-obligation survey of your shipping room fastening methods. Or mail the coupon.

Fasten it better and faster with

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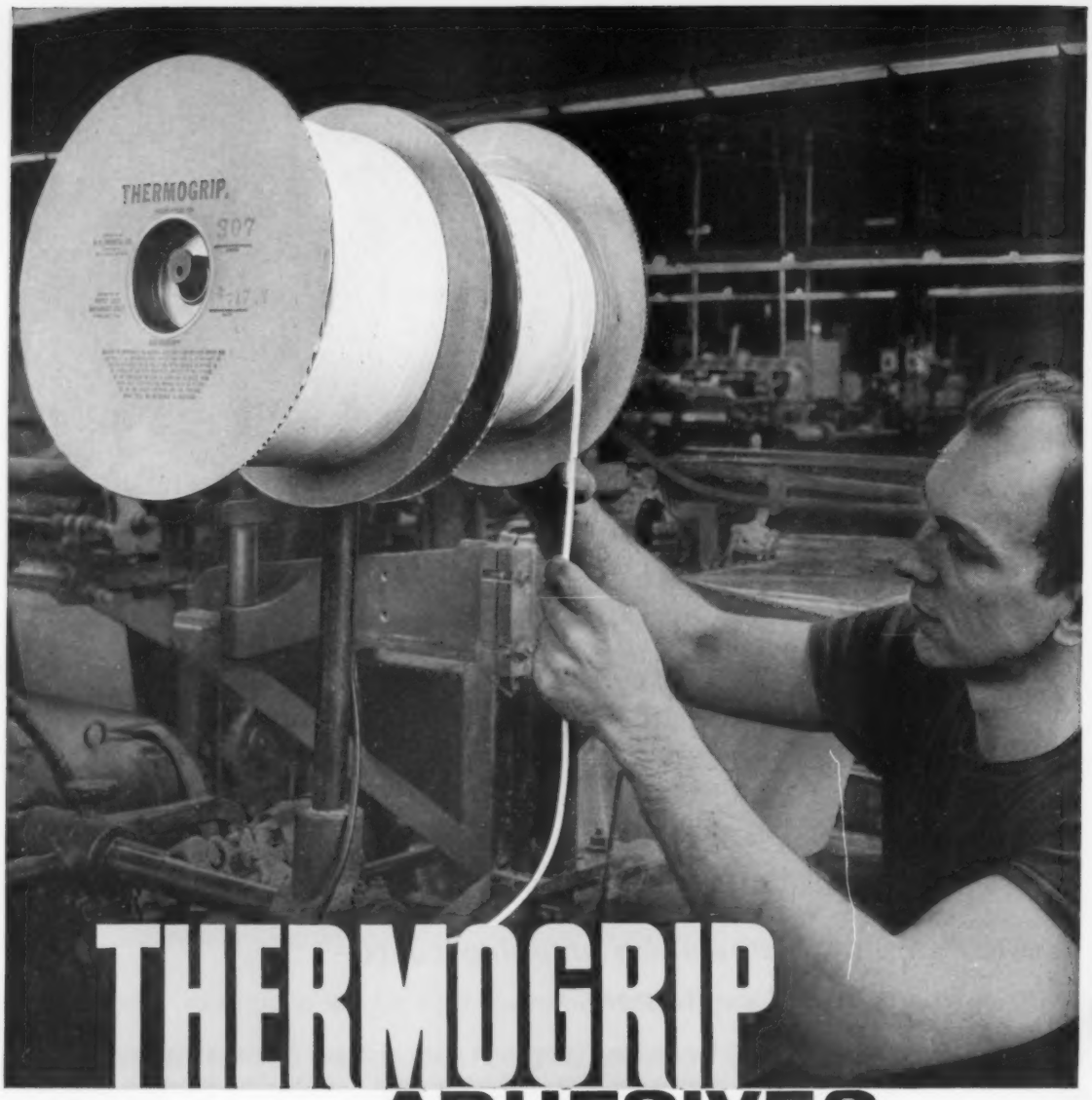
Bostitch, 864 Briggs Drive, East Greenwich, Rhode Island
Please send me literature on the use of Bostitch equipment in the shipping room.

We ship _____ (Kind of product)
We now ship in _____ (Kind of container)
Our containers are fastened with _____ (Fastening method)
Name _____
Firm _____
Address _____
City _____ Zone ____ State _____



THERMOGRIP ADHESIVES

When Machine Speed, Handling Ease, Quick Setting, Production Economies are Important

THERMOGRIP hot melt adhesives can give you closer control over costs and bond quality than you've ever had before! Using any of six different THERMOGRIP applicators — each a complete "packaged" adhesive system — you can get faster production from present equipment or equipment of new design. And quick-setting bonds improve the product of the packaging or converting machine.

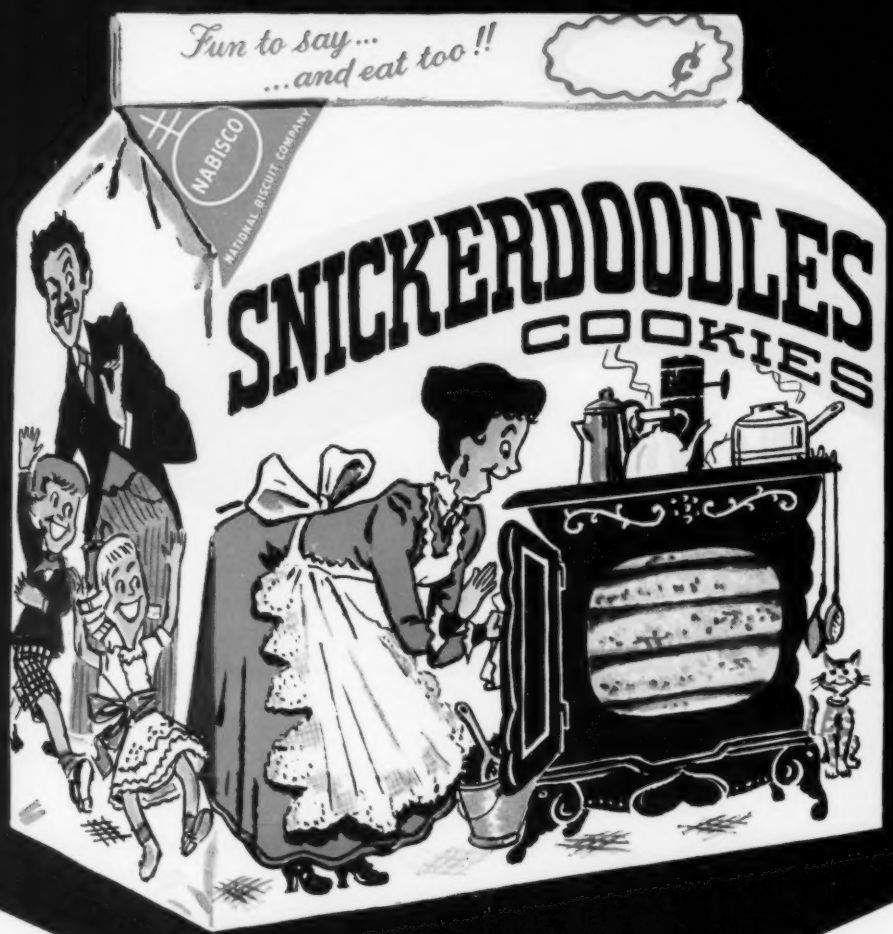
Because of THERMOGRIP Adhesives, new carton gluing machines are ten feet shorter. A converter combines multiple units with better register and appearance, cuts out a separate costly operation. Package users are closing cartons of hard-to-bond surfaces fast and neatly. In many installations production rates are up 50% or more.

THERMOGRIP Adhesives and applicators will give you the most up-to-date bonding method available. Glues standard or hard-to-stick materials such as poly, foils, waxed surfaces, porous materials, special papers.

Tell us the materials you're gluing and describe your equipment. We shall be glad to suggest how THERMOGRIP Adhesives can help you. United Shoe Machinery Corporation, 140 Federal Street, Boston, Mass., LIberty 2-9100.

United

NABISCO's Unique, Sparkling, Eye-catching Cookie Bag is made of NIBROC® WHITE



Today's fastest growing packaging paper engineered for tomorrow's uses

More and more producers of products ranging from Bakery Goods to Plant Foods to Briquets are packaging their products in paper—and the top choice of converters and end-product users alike is Nibroc White.

Strong, bright Nibroc White prints beautifully . . . handles superbly on forming, filling and closing machinery. Available in super-calendered and/or embossed finish.

Discover for yourself why so many of America's "Brand Name" products are packaged in Nibroc White. Write for samples and complete information to our Paper Sales Division, Department RK-4, Boston, Massachusetts.

Another Quality Product of BROWN COMPANY

General Sales Office: 150 Causeway St., Boston 14, Mass. • *Mills:* Berlin and Gorham, N. H.

For more information circle No. 222 on Reader Service Card

...And it stays Fresh when

Other new Ludlow Plastics include:

PROPLENE* A clear, strong packaging film made from polypropylene resin. Good printability, exceptional shelf life and oil resistance. Performs well in a variety of packaging machines. Can be boiled, sterilized or autoclaved.

CAPLENE* An exceptionally strong high gloss packaging film made from nylon-6. Heat sealable and printable. Excellent resistance to greases, oils and odor penetration. Can be boiled, sterilized or autoclaved.

METAFOAM* A flexible, textured sheeting made from foamed polyolefin. Tests show excellent thermoformability, insulation values, heat sealability and abrasion resistance.

See Ludlow's complete line of packaging materials at **BOOTH 626**, *AMA National Packaging Exposition, Chicago—April 13-17*

For more information circle No. 223 on Reader Service Card

it's Protected with Ludlow METAPLENE*

Transparent wrapping *can* be a boon to any edible product – but only if it keeps the product tasting as good as it looks. Ludlow's METAPLENE keeps moisture in place to preserve both flavor and freshness. But that's only part of the story. METAPLENE – Ludlow's new medium density polyethylene film – has excellent machineability and good printability. It has greater shelf life than cellophane – *yet it costs less!* And it's *unequalled* for gloss and clarity.

See for yourself what METAPLENE can do for *your* products. Send today for samples and technical data on METAPLENE and other new plastic films and foams by Ludlow.

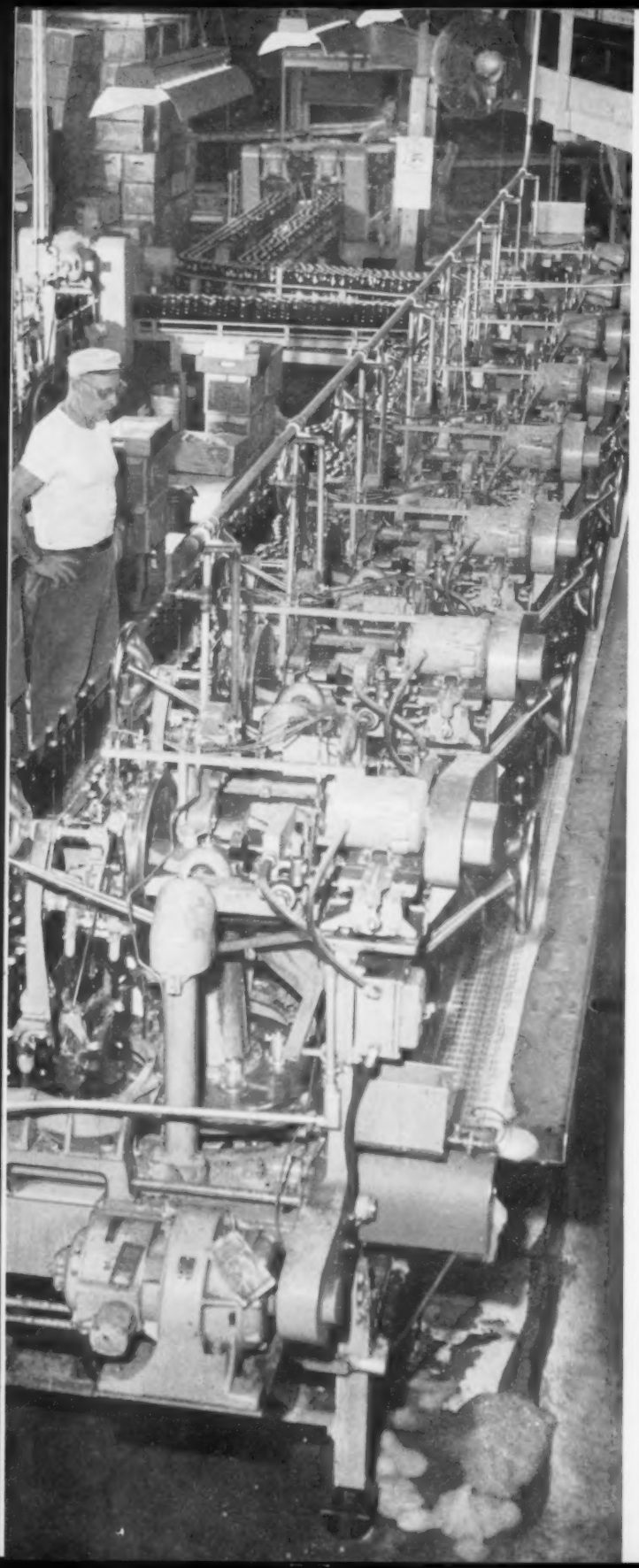
*Trademark applied for by Ludlow Papers, Inc.

LUDLOW PLASTICS

NEEDHAM HEIGHTS 94, MASSACHUSETTS

Ludlow Plastics is a division of LUDLOW PAPERS, INC., manufacturers of fine papers, gummed label papers, gummed tapes, building papers and packaging papers. Ludlow Papers, Inc., is a subsidiary of Ludlow Manufacturing & Sales Company, manufacturers of jute and jute products.

For more information circle No. 223 on Reader Service Card



Label with WORLD

Today's high speed World Tandem Labeler is the most efficient machine ever offered for production labeling of glass containers. More features . . . more capacity . . . more automation.

SPEED . . . The World Tandem Labeler is available in models for speed requirements of 60 to over 600 bottles per minute.

AUTOMATION . . . The "Modulated Speed Control" system senses "Line-Load" conditions and automatically adjusts to meet production requirements.

RESERVE CAPACITY . . . Bottle line speed is not affected by the temporary shutdown of any individual unit since the remaining units can be speeded up to handle the entire production.

CENTRALIZED GLUING . . . now quarter-turn ball valves at each labeling unit control adhesive flow quickly . . . economically.

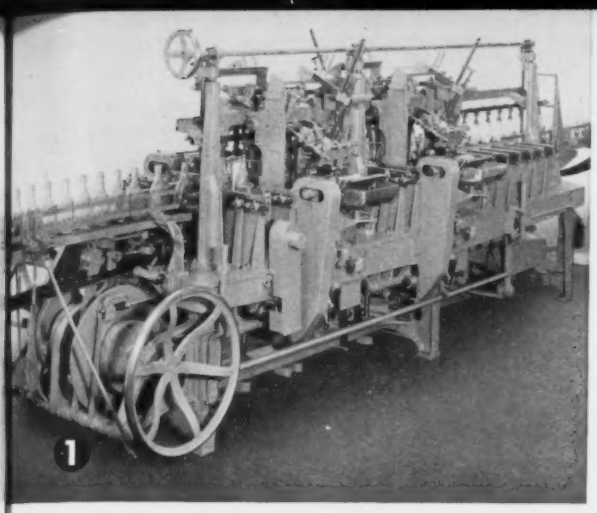
PRECISION LABELING . . . positive control of bottles and labels at all times . . . smooth, efficient wiping assures neat label application.

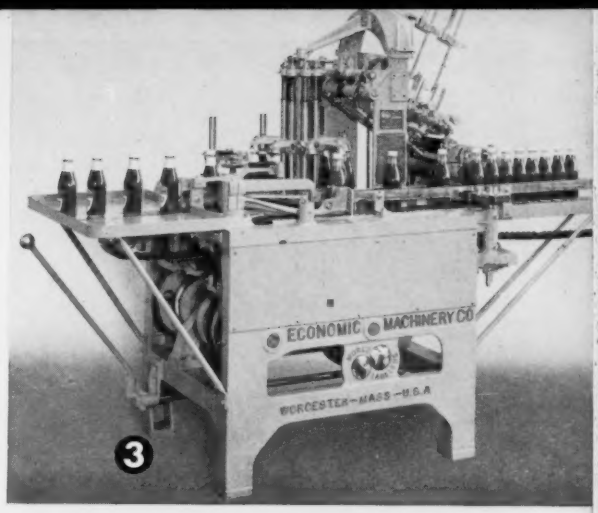
FLEXIBILITY . . . The World Tandem Labeler is engineered to apply any combination of body, shoulder and neck labels **simultaneously** . . . paper or foil.

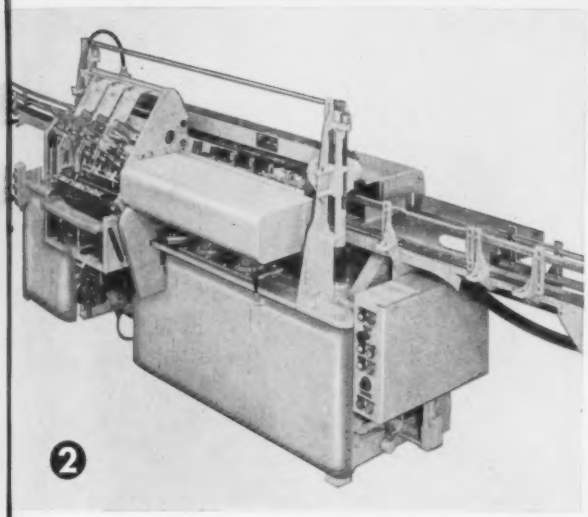
CONTINUOUS PRODUCTION . . . The World Tandem Labeler is the **only** machine which assures uninterrupted production labeling. World's Multi-Purpose Conveyor system feeds bottles gently and continuously . . . automatically channels them to each labeling station and maintains flow.

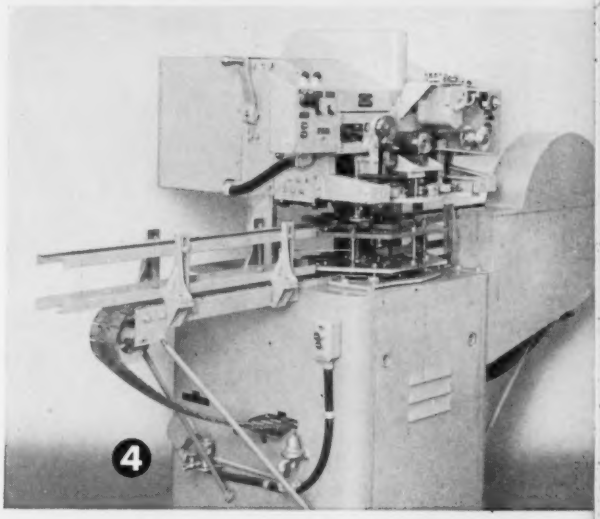
Your labeling operation is vital to your bottleshop efficiency. If you are not getting top performance, why not see a World Tandem demonstration? We'll be happy to make the arrangements.

Model 8 Tandem









1. The WORLD Bee-Line Labeler. This compact, straight line machine assures gentle, shock-free travel for glass containers. Each bottle or jar is kept separated during the entire labeling cycle. Speed ranges from 30 to 120 containers per minute . . . continuous production . . . several labels can be applied simultaneously.

2. The WORLD Super C.M. Labeler. Here is the ideal machine for production labeling of up to 320 bottles per minute. Unusual bottle shapes or several labels per container are easily accommodated by the streamlined Super C.M. Exclusive features assure positive container control and **continuous motion** . . . the secret behind Super C.M. efficiency.

3. The WORLD Turret Labeler. Unique bottle shapes or intricate containers which require fancy labels are especially suited to the fully automatic World Turret Labeler. Quick changeover from one label-container combination to another is another plus feature. Requires very little supervision during operation.

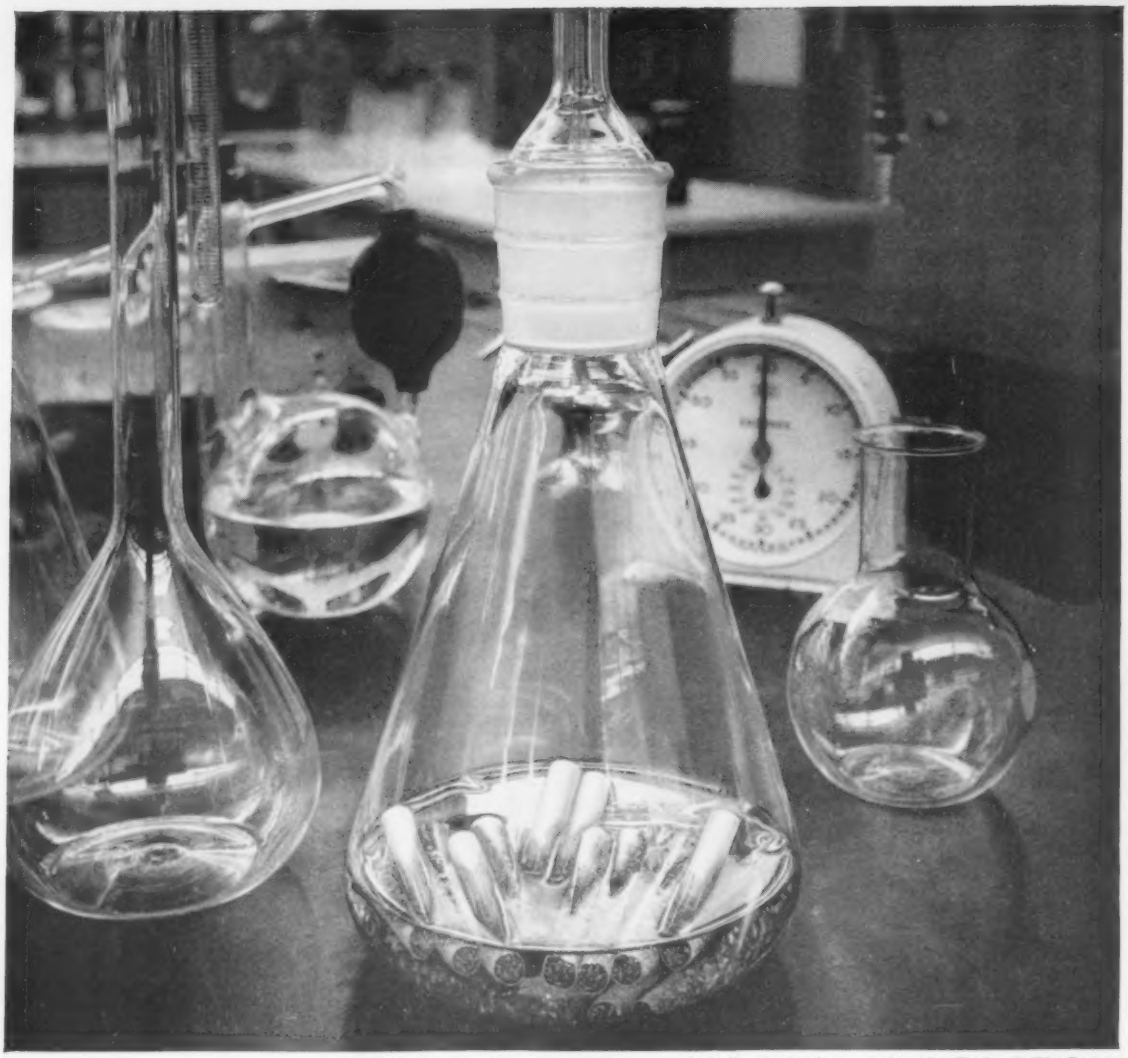
4. The WORLD Automatic Bander. Here's another World first . . . automatic application of plain, printed or window-type cellulose bands **from rolls.** Significant savings in band cost . . . electronic feed mechanism and "cut-off" included. Applies bands in perfect register. Models available for all speed requirements.

Good Labeling Sells!

WORLD LABELERS

ECONOMIC MACHINERY COMPANY • WORCESTER 3, MASS., U.S.A.
Division of Geo. J. Meyer Manufacturing Company

For more information write direct to manufacturer



A Moisture Analysis Test on Cigarettes . . . typical of hundreds of tests conducted at Du Pont's Film Department Technical Laboratories to evaluate the moisture protection and other performance data of cellophane.

Tests like this help Du Pont develop cellophanes with exactly the moisture protection your products need

Each of Du Pont's more than 100 types of cellophane has a specific water vapor permeability. Some let moisture in . . . others keep it out. There are cellophanes to protect the 12% moisture content of cigarettes . . . the 35% of white bread . . . the 37% of Cheddar cheese . . . the 3% of dry shredded coconut.

Other cellophanes are tailored to meet the WVP and other requirements of items like candy, cookies, meats, produce, cereals, chips.

Cellophane's outstanding balance of properties makes it the most versatile packaging material you can use.

Experiments like the one shown above assure that you get the cellophane tailored to meet *your* needs . . . when you specify Du Pont cellophane by code designation.

When you need help, call your Du Pont Technical Representative. He is your best source of service. His reference folder, "Properties and Uses of Cellophane", can be useful to you. Ask him for a copy or write direct to E. I. du Pont de Nemours & Co. (Inc.), Film Department PE-4, Nemours Bldg., Wilmington 98, Delaware.

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

DU PONT cellophane

PACKAGE Transwrap at Edgar P. Lewis & Sons

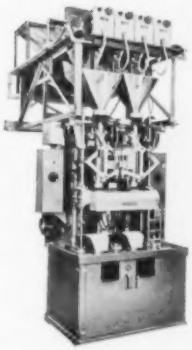
SAVES ON FILM AND PRODUCT

"The Transwrap has accomplished a double cost reduction for us here at Lewis. This measurable reduction has been achieved through more precise weighing and a hairline seal at both ends of our polyethylene pouch," says John Didio, Vice President of Edgar P. Lewis & Sons, Malden, Mass.

The Model PS cantilever net weight feed provides the most accurate, trouble-free weighing available anywhere. There are no knife edges to get out of adjustment. A spring-actuated roller reduces friction, and an electro magnet controls dribble feed with extreme accuracy. The Transwrap scale provides easy adjustment through the full range of weights and all surfaces in contact with the product are constructed of stainless steel.

New also, is the improved impulse sealing mechanism for polyethylene with a cold-wire cut-off that gives a ⅛″ seal at the ends of the package. This thin-line sealer saves Lewis as much as 7% in material over packages run on a conventional machine.

The Transwrap machine comes in two models, the TWB and TWC, both with new design features to improve packaging operations and cut costs. For complete information, contact your nearest Package representative today.



PMMI

PACKAGE

PACKAGING IS PART OF YOUR PROFIT PICTURE

PACKAGE MACHINERY COMPANY, EAST LONGMEADOW, MASS.

NEW YORK • PHILADELPHIA • ATLANTA • BOSTON • CLEVELAND • CHICAGO • KANSAS CITY
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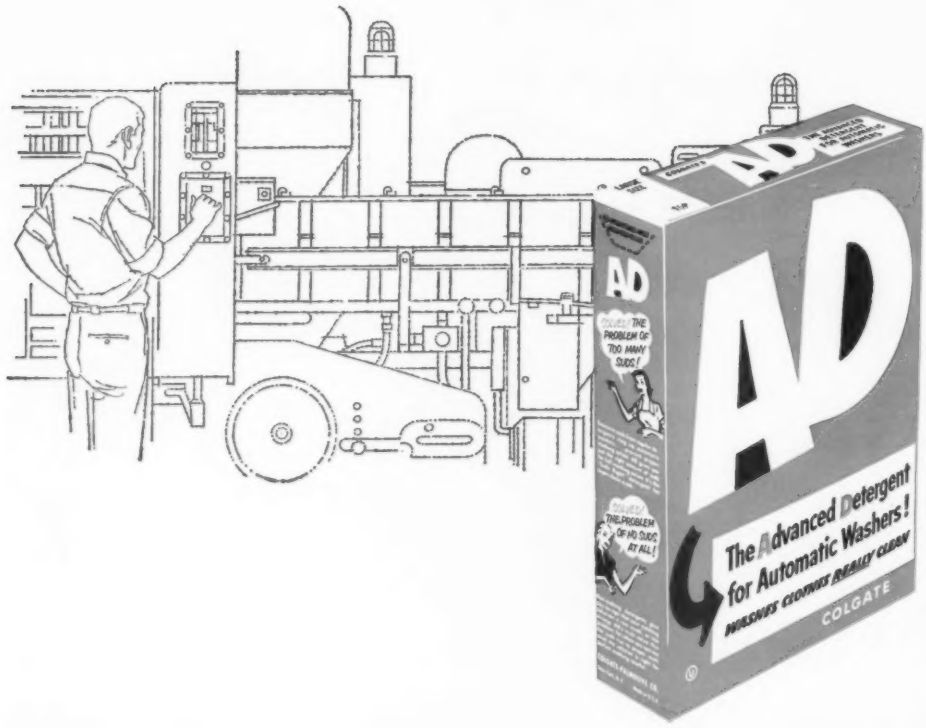
For more information circle No. 225 on Reader Service Card

Easi-Clean RESIN ADHESIVE

FROM THE NEW CHEMISTRY OF ADHESIVES



ELIMINATES SCRAP AND SIFTER LOSSES

EASI-CLEAN lowers packaging costs by increasing efficiency in carton sealing and forming. Improves adhesion. Eliminates pop-ups and sifters. Avoids scrap and product losses. Permits maximum machine speeds. Increases adhesive mileage.

EASI-CLEAN runs as easily as ordinary adhesives. As long as a week without cleanup. Washes off with water. Forms no insoluble skin in the glue pot. Doesn't build up on rollers.

EASI-CLEAN is now in widespread use for carton sealing and forming. A trial run will quickly demonstrate its resin-adhesive advantages. We'd be glad to help. Write or call your nearest National office, telling something of the use you have in mind.

VISIT US AT THE PACKAGING SHOW, BOOTH 750

National
ADHESIVES • RESYNS® • STARCHES

NATIONAL STARCH PRODUCTS INC.
750 Third Avenue, New York 17
3641 So. Washtenaw Avenue, Chicago 32
735 Battery Street, San Francisco 11

PACKAGE YOUR PRODUCT TO PLEASE IN ALUMINUM AEROSOLS BY WIRZ

New

Convenient aerosols in handy new "personal" sizes assure added sales appeal for a wide variety of products . . . now *beautifully* at home in boudoir, travel bag or bathroom shelf.

Wirz improvements in aerosol design and manufacture meet your most exacting packaging requirements, too. Wirz aluminum aerosols are light in weight, completely rust-free . . . newly engineered to provide easier, simplified dispensing of cosmetics, pharmaceuticals and household specialties. Seamless, one piece construction eliminates any possibility of leakage . . . insures positive protection for your liquid or semi-liquid product formulations.

Wirz packaging specialists are prepared to produce aluminum aerosols promptly and economically . . . to your particular design and size specifications. Contact your Wirz representative or write for complete data on *new* aluminum aerosols by Wirz.

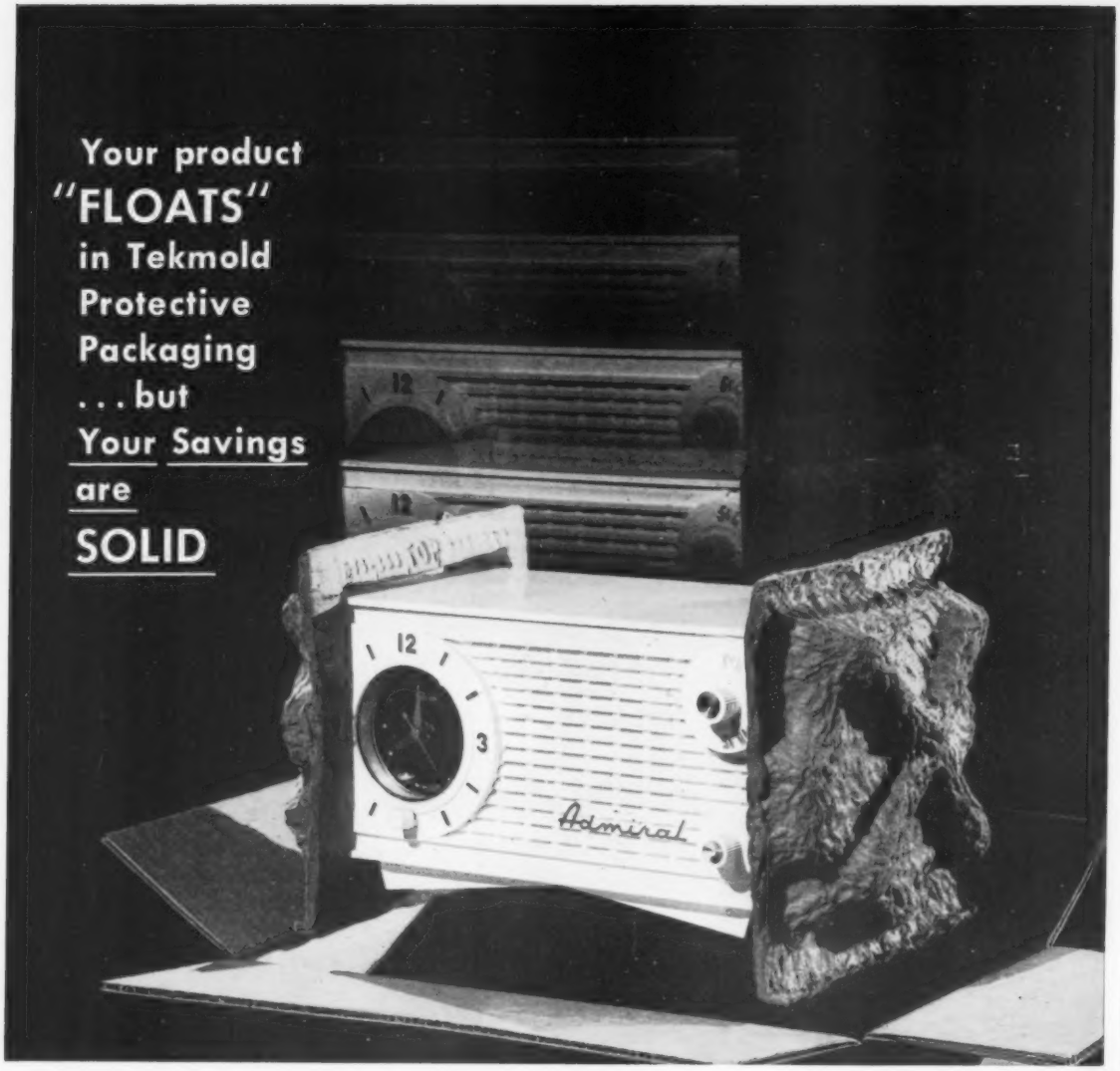
Another Development by America's Leading Producer of Collapsible Metal Tubes

A. H. WIRZ Inc.

4TH & IRWIN STREETS, CHESTER, PA.

ALSO RIGID CANS & IMPACT EXTRUSIONS—AMERICAN EXTRUSION DIVISION

NEW YORK • CHICAGO • LOS ANGELES • MEMPHIS • HAVANA



Your appliances, fragile instruments or other easily marred or damaged products "float" safely in Tekmold Protective Packaging . . . cushioned in the custom-formulated, custom-molded forms.

But that is only half of the wonderful story.

There is an excellent chance you can save up to 40 percent on your internal packaging costs.

At right are three typical experiences, reported by two of the largest radio manufacturers in the country.

MANUFACTURER X . . .

Previously used 3 pieces of corrugated and wrap	15.3¢ per unit
Switched to Tekmold end caps and wrap	12.6¢ per unit
Package saving	**2.7¢ per unit**
Additional labor saving with Tekmold	3.0¢ per unit
Total saving	**5.7¢ per unit**

MANUFACTURER Y . . .

Previously used 4 pieces of corrugated and cabinet wrap	14.175¢ per unit
Switched to Tekmold end caps without wrap	10.6¢ per unit
Package saving*	**3.575¢ per unit**

MANUFACTURER Y . . .

Previously used 2 corrugated inserts and cabinet wrap	20.0¢ per unit
Switched to Tekmold end caps and wrap	10.6¢ per unit
Package saving*	**9.4¢ per unit**

*There were also labor savings, not detailed in the report.

Let's end this message with a verbatim quote from the packaging foreman of a large appliance manufacturing company that switched to Tekmold Protective Packaging:

"Boy, I hope I never see a corrugated fold-up again!"

For the *complete* Tekmold story, write or phone us today.

TEKMOLD PRODUCTS PLANT
Bemis Bro. Bag Co.
325 27th Ave., N. E., Minneapolis 18, Minn.

BEMIS

For more information circle No. 228 on Reader Service Card

BATTLE CREEK'S MODEL 475 handles heat sealing films with ease!

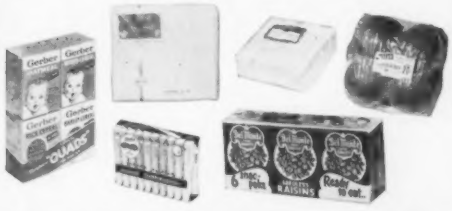
Tested on over 40 different formulations of plastic overwraps, the Model 475 handles all of them with amazing facility. Such versatility gives you wide latitude in selecting the film desired for wrapping your product *today* with the full knowledge you can take advantage of economies offered by new heat sealing films developed *tomorrow*. Your investment in the Model 475 is an investment in the future. This all-purpose machine wraps attractive, neat packages at speeds ranging up to 75 per minute within a range of 5" to 12" lengths, 3" to 8½" widths and ¼" to 4" heights. A special 5" to 9" range is available for wider packages and for bundling purposes. Size changeovers can be made in 15 minutes or less. Optional equipment such as automatic accumulators, top labeling devices, code daters, easy opening devices., etc. are available if desired.

Changeover from one type of wrapping material to another is quick and easy

The Model 475 is *"Continuous Flow"* engineered to handle changes in wrapping materials with a minimum of effort, time and materials. Changeover from one type of soft film to another does not require the purchase of additional equipment . . . actually adjusting the electronic heating controls to the range appropriate for the heat sealing of the new material is all that is required. Battle Creek's exclusive new "Thermo-pad" sealing process carries each individual package in special holders, held by *"Continuous Flow"* chains, exactly timed to apply the correct amount of heat, pressure and cooling time for "Weld-tite" seals. Handles regular cellophanes, heat sealing foils, etc., equally as well as the newer plastic films.

PACKAGES LIKE THESE

now produced on former overwrapping machines can be efficiently handled by the Model 475.



Typical applications: textile packages (underwear, handkerchiefs, pillow slips, etc.); paper products such as flat stationery, envelopes, napkins, bakery products, such as hot dog or hamburger buns, large cakes, specialty items; cartons; open top trays.

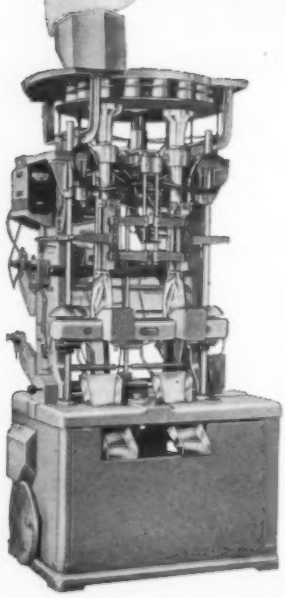
Overwrap with any of these soft plastic formulations . . . on a machine that will not be outdated by new film developments

POLYETHYLENE (medium, low and high density in gauges 1 mil and up)
POLYSTYRENES • HEAT SEALING CELLULOSE ACETATES
HEAT SEALING FOILS • POLYVINYL CHLORIDES • CELLOPHANES
POLYPROPYLENES • POLYMER COATED CELLOPHANE FILMS

BATTLE CREEK *Continuous Flow* PACKAGING
packaging machines, inc.

100 TWELFTH STREET
BATTLE CREEK, MICHIGAN

this polyethylene package is made with 15% LESS film!



STOKESWRAP "impulse seal" eliminates tabs, cuts film costs

Every seventh package at no cost! That, in effect, is what Pioneer Growers Cooperative of Belle Glade, Florida, has achieved with STOKESWRAP "impulse sealing" to package its famous brand of radishes.

With conventional sealing methods, each package required an additional inch of film in the form of tabs or ears. With STOKESWRAP impulse sealing, however, the package is cut off at the seal, eliminating the tabs and saving up to 15% in film length required. Electric eye control assures positive registration of the printed web. Positive sealing and cutoff are completed quickly in one automatic operation at high speed. The web is held in constant tension with no reversing, for smooth trouble-free operation.

"Due to the nature of this sealing and cut-off device, we can safely say we are saving nearly 15% in film," reports Mr. F. C. Dooley of Pioneer Growers.

Made from 1.25 mil polyethylene web 11⅛" wide, the 8-ounce package above measures 5¼" x 7¾". Elimination of conventional ears saves 1-inch of film length per package. STOKESWRAP with its wide selection of feeds — pocket, auger, tablet counting, net-weight scale and special mechanisms — is ideally suited to polyethylene packaging a great variety of products.

For complete details on how "impulse sealing" can cut your packaging costs, write to:

Putting Ideas to Work

FOOD MACHINERY AND CHEMICAL CORPORATION

FMC Packaging Machinery Division

Stokes & Smith Plant

4994 SUMMERDALE AVENUE, PHILADELPHIA 24, PA.

Aluminum Foil Packaging –Vacuum Packaging

Report No. 20 of a Series by Reynolds Metals Co.

Of all methods of flexible packaging, only the vacuum pack approaches the ultimate in the protection it provides. Used for foods and other products subject to deterioration and spoilage, vacuum packaging in its complete form provides by far the greatest protection against moisture loss or gain, oxidation, chemical change or decomposition and bacterial changes. It assures to the consumer higher quality maintained over a shelf life many times longer than is possible with products not vacuum packaged.

To achieve its high potential, vacuum packaging must have perfection in the material used. The material must be impermeable to water vapor, oxygen and gas permeability. It must maintain this impermeability under varied conditions—high and low temperatures, high and low relative humidities. In flexible packaging, these extreme specifications can be met only with aluminum foil as a component of the material used. And aluminum foil also provides impermeability in another useful sense. It is completely opaque—excluding light rays that can cause losses of vitamins, nutrients, flavor and color.

Various Foil Materials

Aluminum foil vacuum packaging materials include laminations to such heat-sealing films as Saran, Vinyls, Pliofilm and Polyethylene. Extra strength or use characteristics can be provided by adding Mylar,* cellulose acetate film, cellophane, paper or fabrics. Other vacuum packaging materials can be made by extrusion coating of aluminum foil.

With these many combinations of materials, various processes can be used. After the evacuation, essential for the removal of all oxygen, it is sometimes advisable to add nitrogen or other inert gas at atmospheric pressure. Also, the possibility of sterilization methods in processing and packaging is to be considered where straight vacuum packaging is not sufficient to prevent bacteria or mold growth—as in packaging meats and other foods high in moisture content. Many other foods can be vacuum packaged indefinitely if they are dry or dehydrated or if they contain a sufficient concentration of salt or other preservative.

Again, the length of storage life depends upon the moisture, gas and oxygen permeability of the package. Laboratory tests have shown that powdered whole milk, coffee, dehydrated meats and vegetables will keep more than two years without loss of quality when vacuum packaged in aluminum foil laminated pouches.

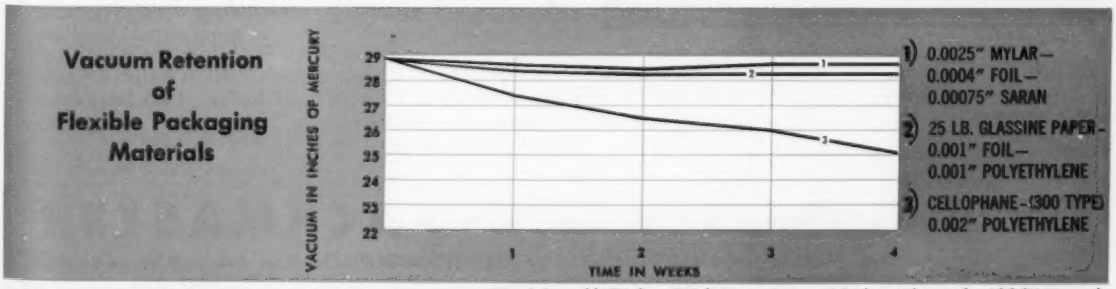
Explanation of Chart

The graph shows typical permeability or vacuum retention properties of three materials used as pouches for vacuum packaging of sliced luncheon meat. All were packed at a vacuum of 29 inches of mercury. Loss of vacuum was measured weekly for four weeks. Note that the pouches with aluminum foil, materials 1 and 2, maintained a vacuum of over 28 inches throughout the four-week test, while the non-foil material lost nearly 4 inches of vacuum. In the same study, the meat in the foil vacuum package, when stored at 40° F., was normal in color, odor and appearance after 40 days, whereas the meat in the non-foil package stored under the same conditions retained its normal color, odor and appearance for only 20 days.

An additional advantage of flexible vacuum packaging over other forms is the saving obtained in weight and in space.

For more information, call any Reynolds sales office or write to **Reynolds Metals Company,** Richmond 18, Virginia.

**Du Pont trade mark for their Polyester film.*

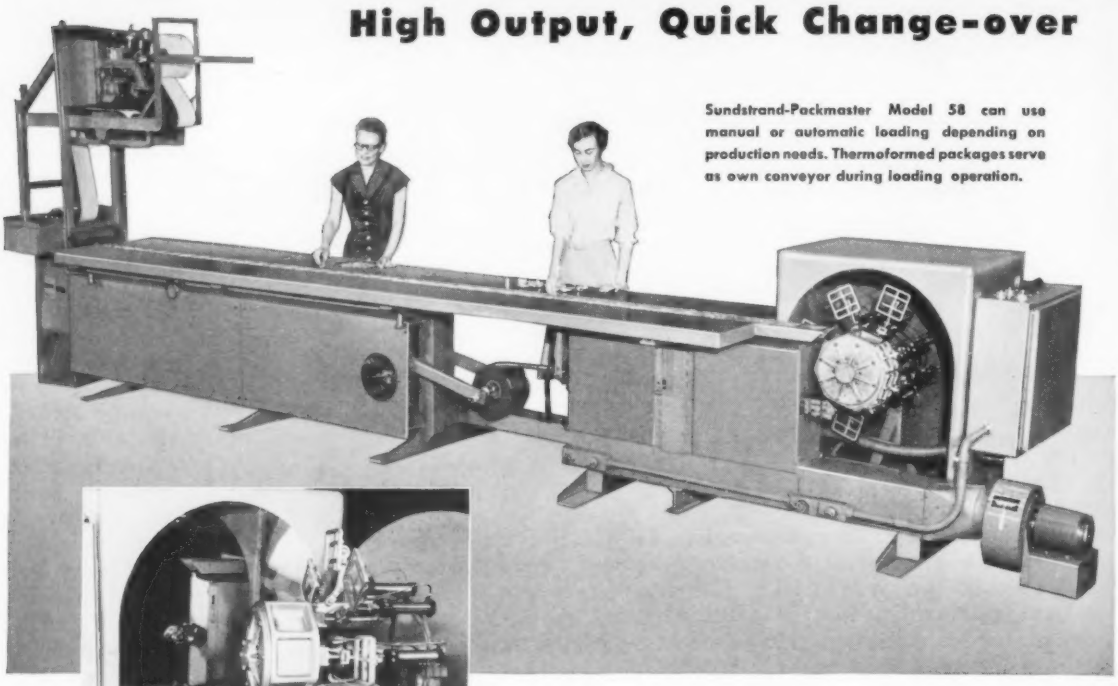


©1959 by Reynolds Metals Company

Watch Reynolds TV show "Walt Disney Presents" Friday nights on the ABC-TV Network.

For more information circle No. 231 on Reader Service Card

New Transparent Dome Pack Machine Features High Output, Quick Change-over



Sundstrand-Packmaster Model 58 can use manual or automatic loading depending on production needs. Thermoformed packages serve as own conveyor during loading operation.

Transparent domes or blisters are formed by interchangeable drum assembly. Wheel-mounted unit is designed for rapid change over.

Six examples of transparent dome or blister packs formed on one Model 58 Packmaster. Trademarks, symbols, etc., can be formed at same time package is shaped.

Thermoformed packages can be produced for an extremely broad range of parts on the new Model 58 Sundstrand-Packmaster machine. Production of 4″ x 4″ packages is 60 per minute, smaller packages are turned out even faster.

Vacuum-formed "transparent dome" or "blister" type packages form their own conveyor as they pass through the Model 58. The finished package offers maximum product visibility, protects against corrosion and permits visual inspection. Packages can be formed to fit irregularly shaped parts if required. Package is sealed by clear or opaque thermoplaster sheet or a kraft-type heat-seal paper, depending on manufacturer's preference.

Trademark, part number, etc., can be printed automatically on the sealing paper. Packages can be cut off individually, be supplied in predetermined multiples by means of a preset counter, or be run in a continuous ribbon. Varying package widths are accommodated by handwheel adjustment.

Packages are formed in a revolving drum-type unit that can be changed quickly to meet production requirements. The entire drum assembly is mounted on wheels, locates on two dowels, and is held in place by two studs fitted with hand knobs. Two hose connections, for air and vacuum, are provided with quick-disconnect fittings.

SUNDSTRAND

SUNDSTRAND-PACKMASTER

Manufactured and Distributed by AMERICAN BROACH, Ann Arbor, Michigan
Division of SUNDSTRAND MACHINE TOOL CO.

A research study of . . .

Corrugated fibreboard boxes for potatoes*

By Kermit Bird,†
Associate Agricultural Economist,
Department of Agricultural Economics,
Division of Agriculture,
Oklahoma State University,
Stillwater

Potatoes have been shipped for many years in burlap, polyethylene, multi-wall, and mesh bags. Recently, there has been some interest in corrugated fibreboard as a potato shipping container. Shippers of other agricultural products have found that corrugated containers offer many advantages, the main among them being the bruising protection offered the produce. This article presents the results of research undertaken by Dr. Bird, as a project of the Department of Agricultural Economics at the University of Idaho Experiment Station. Including photographs of the boxes tested, he discusses the step-by-step procedure of the study.

The objectives of this study were: (1) **to find whether packing potatoes in corrugated fibreboard boxes enables shipping of larger loads per refrigerator car, and (2) to find what type of box offers best protection to potatoes when shipped in large loads.** Our first step was to design a number of different type boxes for the test shipments. Test boxes designed differed with respect to **three factors:**

a. **Fluting**
b. **Weight of board**
c. **Ventilation type**

With respect to fluting, we were interested in whether A-flute was better than B-flute. Two board weights, 200- and 250-lb., were used in making up the boxes. Nine ventilation types were used. So our experiment consisted in finding whether any of the 36 different boxes was better than the others.

In addition to the three treatments, we added another variable **—layers.** We loaded three cars with boxes piled seven high (the usual car-loading method has boxes five high). The bottom three layers were considered critical for weight damage; so each test box was placed in each of the three bottom layers.

Thirty-six different 50-lb. potato cartons were designed and tested. Test consisted of filling the boxes with selected potatoes, loading them in prearranged places in the car, shipping them from Idaho to Pennsylvania, and grading each box of potatoes for bruises.

EXPERIMENTAL

Car Loading

Three cars were shipped loaded with test boxes; and each end of each car contained 108 test boxes, three layers of 36 boxes each. Loading of the test boxes was as follows:

Each test box was labeled according to its fluting, weight of board, ventilation type, layer and car end.

Each car end was not a replicate although in the analysis they were treated as replicates. Car ends were repeated tests of the same boxes, but the test boxes were located differently in each car end.

Test Box No. 1 was in Row 1, Column 1, in Car End 1. In Car End 2, Test Box No. 1 had moved to Row 2 and Column 2, and so on. In the sixth car end, this test box was placed in Row 6, Column 6.

This particular car loading method was employed to eliminate any effects of row and column within the car.

Within a vertical column, each of the three bottom test layers had the same kind of test box. The four layers of boxes on top of the three test layers were control boxes and were there to put weight pressure on three bottom layers. The remaining central section of the

*This study was made at Department of Agricultural Economics, University of Idaho Experiment Station, Moscow. The research is a contribution to Western Regional Marketing Research Project Wm-19. Dr. Bird was assisted in the project with specially made boxes supplied by Boise-Cascade Lumber Co. and by Western Idaho Potato Growers who supplied use of their plant facilities for packing the potatoes.

†Dr. Bird was associated with University of Idaho, Moscow, at the time he conducted this study.

Fig. 1. Potatoes were shipped from Caldwell, Idaho, to Pittsburgh, Pa.

car was also filled with control boxes.

The first car was loaded with boxes lengthwise in the car, except for the doorway where they were loaded crosswise. This car contained 994 boxes. **The second and third cars were loaded with one column lengthwise, one column crosswise, etc.** This second loading method was more efficient spacewise, allowing 1050 boxes to be loaded per car.

Inside dimensions of the cars used for the test shipments were 33 ft. 2¾ in. long, and 8 ft. 3 in. wide. The car height of 7 ft. 3 in. allowed about 18 in. of air space above the top layer of boxes.

Potatoes shipped were early russets. The first car was shipped September 4, 1958. The second and third cars were shipped September 8 and 9. **All three cars were half-stage iced. Cars were six days en-route,** arriving in Pittsburgh on the morning of the seventh day. (See Fig. 1.)

Design Of Boxes

All boxes were two-piece, half-slotted, full telescopes. Joints were glued; tops and bottoms were stapled with 12 staples on the bottom and 8 on the top. Waterproof adhesive was used in construction of all boxes. Each box held 50 lb. of potatoes.

Half of the test boxes were of 200-lb.-test corrugated board, paper weight being 42-33-42. The other half were of 250-lb.-test, paper weight of 69-33-42.

Dimensions. One-half of the test boxes were of A-flute board; one-half of B-flute. Inside dimensions of the two boxes were 17⅛ × 13 × 9½ in. Outside dimensions of the A-flute box were 17⅞ × 13¾ × 9⅞ in. B-flute, being slightly thinner board, had outside dimensions of 17⅝ × 13½ × 9¾ in.

A-flute board has 36 flutes/lin. ft. and the flute height is 3/16 in. B-flute board has 52 flutes/ft. and the flute height is ⅛ in. Characteristically, A-flute provides greater strength in the depth direction. However, it has less flat-crush strength than B-flute board. Boxes made from B-flute have less vertical strength, and greater lateral and puncture strength than A-flute boxes. See Fig. 2 for an illustration of these two flute types.

There were nine ventilation types, as follows:

1. Two ¼x3-in. vent slots on each side panel, and ¼x3-in. vent slot centered in each end panel.
2. One ½x1½-in. vent hole centered at top-flap score at each end; also, one ½x1½-in. vent centered in length adjacent to top-flap score in each top flap.

Summary Of Results

- If potatoes are shipped in corrugated fibreboard boxes, it is possible to ship 525 cwt. of potatoes in a car with minimum bruising. Potatoes are usually shipped 300 or 400 cwt/car, so this large load is 31 to 46 per cent larger than normal.
- No bruising damage differences are apparent to potatoes among the bottom three layers in a car filled with layers seven high. Potatoes in the bottom layer had no more bruises than the other layers.
- Ventilation is satisfactory in boxed potatoes, if boxes are not wedged too tightly in the car. Loading methods are much more important to ventilation than ventilation features of the box itself.
- Certain types of corrugated board protect potatoes better than others. Our tests show B-flute superior to A-flute.
- Boxes made from 200-lb.-test board were just as good as, or superior to, boxes made from 250-lb.-test board. Since the "lighter" board is cheaper (boxes will cost $0.03 to $0.04/cwt. of potatoes less), we are recommending boxes of 200-lb. strength.
- No one ventilation type box was better at protecting the potatoes from bruises than the others tested.

Kermit Bird received his B.S. and Ph.D. degrees from Pennsylvania State University, and his M.S. from Cornell University, in agricultural economics. Prior to his present position, he was associated with the Department of Agricultural Economics, University of Idaho, Moscow, where he did research on packaging of agricultural commodities. Also at Idaho, he published a group of bulletins on packaging and packing of potatoes. He is a member of American Farm Economic Association, Western Farm Economic Association, and Association of American University Professors.

3. One 1x3½-in. hand hole in each end.
4. Hand hole as above plus two ¼x3-in. vent slots through each side panel.
5. Two 1-in. circular vent holes in each end.
6. Two ½x1½-in. vertical slots in each end panel.
7. No vent holes of any kind, printed.
8. No vent holes of any kind, no printing.
9. Hand holes in each end, plus top-flap gap.

Fig. 3 illustrates these nine ventilation types. (Numbers above correspond to those in the photographs.)

In summarizing this section on the design of the test boxes, we had 648 corrugated boxes, 324 A-flute and 324 B-flute, 324 heavy-board boxes and 324 light-board boxes. There were 72 boxes of each of the nine ventilation types. Each of the three layers contained the 36 test boxes; so, all three layers had 108 test boxes. The test was repeated six times in each of the six car ends; the total boxes tested was 648.

Grading Methods

Our method of determining whether one type box was superior to another was the protection offered by the box to the potatoes. **The test of the box consisted of grading the potatoes for bruises, after the potatoes had been shipped.**

Since the potatoes within each car end were from the same lot, and the same truck load, we reasoned that the potatoes within a car end should be essentially the same before shipping. Differences in bruises to the potatoes within a car end would be the result of using different boxes.

Sorted in three groups. In our bruise determination test, we opened each test box and examined all potatoes within this box. For each box, potatoes were sorted into three groups according to damage:

1. Potatoes with slight or no bruises;
2. Potatoes with moderate bruises, still edible but in need of paring;
3. Potatoes with serious bruises — virtually inedible — bruise culls.

Other defects of the potatoes, such as sunburn, greening, rot, and wireworm, were not considered in this grading process. In other words, **unless the potatoes were bruised in some way they were considered as perfect potatoes.**

Uses "bruising index." With the three groups, we computed a "bruising index." A low index means potatoes were bruised little; thus, the lower the index, the less the bruising. The lowest possible index is 100—perfect potatoes; the highest, 2500—all culls.

FINDINGS OF STUDY

Layers

Layers had no effect on our test boxes; i.e., potatoes in boxes on the bottom layer were bruised about the same as potatoes on the next-to-bottom and third-from-bottom layers. A check test of the top layers showed the boxes in the three bottom layers to be about the same as the top-layer boxes. **It tells us that potatoes may be shipped in corrugated fibreboard boxes.** (See Fig. 4.)

The present method of shipping 360 or 400 cwt/car in burlap results in bruised potatoes, particularly at the bottom layers. With boxes, 525-cwt. loads of potatoes can be shipped with practically no shipping damage.

The implication of this is that potatoes now may be shipped in larger loads. With larger loads, freight rate reductions may be possible. Freight rate reductions, plus the cost savings possible through having fewer bruised potatoes, may put corrugated fibreboard in a good competitive position relative to burlap.

Fluting

Fig. 2 shows the two flute types that were tested. A-flute gives greater vertical strength, B-flute gives better horizontal or crushing protection.

Our problem in testing fluting was that we didn't know which was needed more for potato shipments, vertical or horizontal protection. For a product unable to carry any weight, as lettuce, A-flute would be desirable. For a product able to carry a great deal of weight, as canned goods, B-flute would be better. Potatoes are able to carry quite a lot of weight as

Fig. 2. Cross sections of B-flute board *(above)* and A-flute board *(below)*. B-flute has 52 corrugations/ft., offers greater horizontal protection. A-flute has 36 corrugations/ft., provides greater vertical strength. (approximately ¾ actual size.)

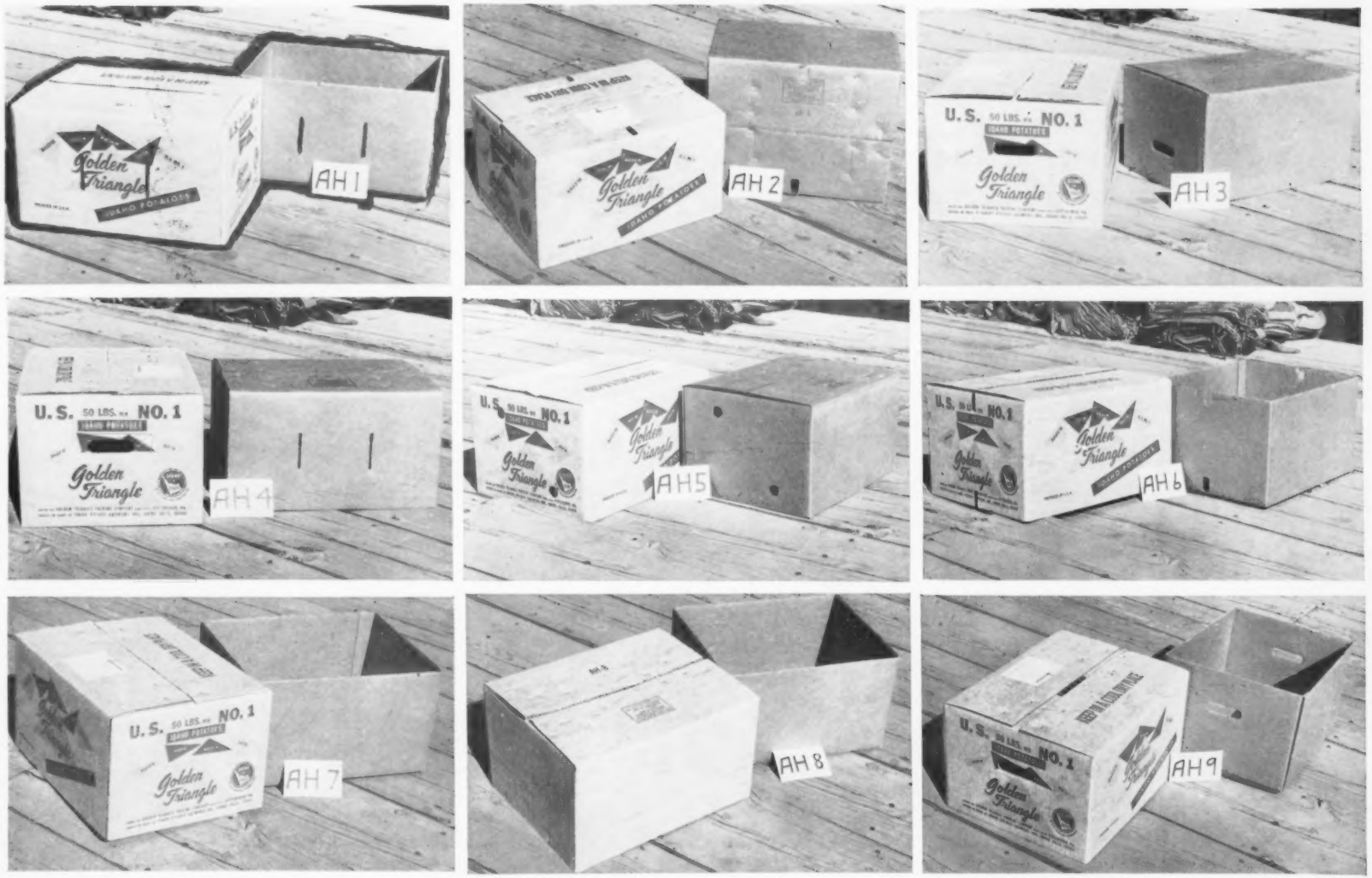


Fig. 3. Nine different types of ventilation used in test shipment of potatoes. Although an interesting side aspect, ventilation effect on keeping quality was not purpose of this study; rather, it was to study effect of different type openings on strength of boxes and, in turn, on bruising protection given potatoes by boxes.

evidenced by high piles in storage cellars. Probably they need both vertical and horizontal protection.

Has an effect. Our analysis showed the fluting of boxes did affect the protection afforded potatoes. Boxes made from B-flute were superior to boxes made from A-flute. Table I tells us that both A- and B-flute boxes gave adequate protection vertically; the major problem, then, came from horizontal damage. B-flute offered better protection from this type of bruising.

TABLE I

Comparison Of Bruising Damage To Potatoes Shipped In A- And B-Flute Boxes*

Flute	Bruising Index
A-flute boxes	231
B-flute boxes	207
Group average	219

*324 boxes in each group

Weight Of Board

Two weights of board were used in constructing the test boxes. One box which we call "heavy" had 250 lb/sq. in. bursting strength. The other, the "light" box, was made of 200-lb.-test board. Apparently, both grades of board were more than adequate for this test. **There is no evidence that the boxes made with 250-lb board were superior to the boxes made from 200-lb. board.**

In fact, although statistical tests show it to be non-significant, our data indicates the "light" may be slightly better than the heavy boxes. (See Table II.) In any event, since light boxes are cheaper than heavy ones, we would not hesitate in recommending the 200-lb. box over the 250-lb. box.

TABLE II

Comparison Of Bruising Damage To Potatoes Shipped In "Heavy" And "Light" Boxes*

Box Strength	Bruising Index
Heavy boxes (250-lb.)	227
Light boxes (200-lb.)	211
Group average	219

*324 boxes in each group

Fig. 4. Effects of pressure on boxes. Box on left shows considerable breakdown. It was shipped with six 50-lb. boxes on top of it. Middle box had five boxes on it; right box, four layers on it. In spite of this box damage, potatoes arrived at market in satisfactory condition.

Ventilation Types

The picture (Fig. 3) illustrate the nine different ventilation types of boxes. Nos. 7 and 8 have no perforations whatsoever and might be described as maximum strength boxes. **All boxes were tested, not for ventilation, but rather on how the various type holes affect the vertical strength of the box and thus the pressure protection offered the potatoes.**

It has already been shown in the section under "Fluting" that vertical pressure is no special problem when boxes are stacked seven high in the car. It is not surprising, then, that **we found no differences among the various ventilation type boxes tested.**

From the standpoint of pressure protection, our analysis shows no one ventilation type distinctly superior to the others. This means that a potato shipper may choose any of the ventilation types and feel assured the potatoes will have adequate protection. No statement can be made about ventilation types not included in this test.

Effects Of Ventilation

An interesting side aspect of this study was the quality of potatoes as affected by ventilation. We had no interest in air ventilation within a box, and our design of nine ventilation types was to find whether the holes in the boxes weakened the box to the extent of having this weakness show up in bruising damage to the potatoes.

We did, however, keep a record of the boxes that appeared to be poorly ventilated. All nine ventilation type boxes appeared satisfactory in this respect.

Our two loading methods did affect ventilation. As explained previously, our first car had the boxes loaded lengthwise. This made an extremely tight fit allowing little, or no, air to circulate among the boxes. In this first car, we found many of the boxes contained potatoes still wet after six days. In addition, rhizoctonia (a white fungus) was present in many of these boxes.

Cars two and three had the boxes alternated by columns. The first column of boxes was placed lengthwise, the second, crosswise, and so on. **This latter loading allowed free movement of air among the boxes, and the potatoes were dried out at time of arrival. Little or no fungus was present in cars two and three.**

Granted that this was not an objective measurement of ventilation, **it is apparent that the loading method is much more important in ventilation than the ventilation features built into the box.**

(*Continued on Page 110*)

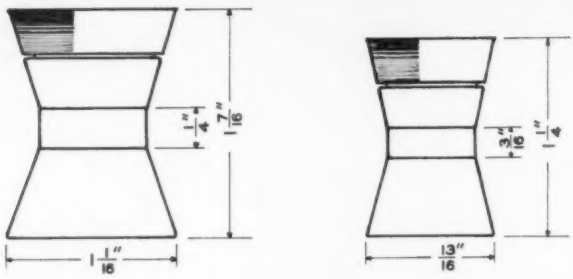


Fig. 1. Actual size of each miniature bottle reveals minimal space available for labeling. Bottle tapering necessitates keeping label within center cylindrical area.

Labeling bottles almost too small to hold

By Herbert J. Oglesby,
Packaging Manager,
Abbott Laboratories,
North Chicago, Illinois

How do you put a pressure-sensitive label around a miniature bottle having a label area with no tolerance for any deviation? In answering that question, Mr. Oglesby and his associates devised an operation balancing the use of both mechanized and manual packaging techniques. He reviews the development and modification of label spotting equipment and tells how it complements a manual labeling application process.

By combining specially developed equipment and coordinated manual packaging techniques, we succeeded in labeling miniature reproductions of standard sized bottles of our Dayalets multiple vitamin tablets. Furthermore, we accomplished this in minimum time and in quantities sufficiently large for sampling the medical profession. Our packaging specialists and equipment engineers worked quickly and effectively on this project to have the samples ready for a mailing deadline.

Focal problem was the label application. These miniature bottles range from 2.5 to 9 cc. Each has a cylindrical area for the label ranging in width from 3/16 to 1/4 in. wide. Since so narrow an area precluded the use of glued labels, we decided to apply pressure-sensitive labels.

Spot Label Automatically

Our next question was how to get these small pressure-sensitive labels in correct position around the cylindrical area of each miniature bottle. Our production and engineering people agreed that the only way to do this with production efficiency would be to have a machine correctly spot each label so that our packaging-line crew might then smooth or roll the label into correct position on its bottle. Manual spotting of labels seemed out of the question.

We started our project with a Derby Sealers electric pressure-sensitive label dispenser. Since

Herbert J. Oglesby attended Lake Forest College where he studied industrial pharmacy and industrial management. Associated with Abbott Laboratories 25 years, he has spent nearly all of that time in the packaging departments. Prior to becoming manager of packaging, he was assistant manager. Mr. Oglesby is vice-chairman of the midwestern production line committee of Packaging Institute.

such a unit feeds out labels one at a time, ejecting each with the backing paper, we undertook to feed the bottles to a point where each label (separated from its backing paper) could meet its bottle. To do this our engineers provided a trough of angle iron positioned with the "V" down so that bottles might slide end-to-end down this trough.

Control Of Spotting

Focal point of control was a Micro Switch which utilizes the difference between the thickness of both label and backing paper and the thickness of this paper alone. A Micro Switch can operate within a 1/1000 in. actuation. Thus, since our labels are 3/1000 in. thick and the backing paper 2/1000 in. thick, we had adequate thickness variation with which to work.

Purpose of the Micro Switch is to actuate a solenoid which causes a roller to move down on top of the bottle. A stop at the end of the trough regulates the height or position to which each label is spotted on the bottle, by controlling the point at which the bottle comes to a stop—for its label.

At this point, the label (feeding from the machine) meets the bottle moving down the trough and is spotted in place in the narrow cylindrical area. The roller rolls out the bottle just as it spots the label and ejects both to a conveyor. There is a spring on an arm that moves up and down to hold the bottle and push it back, in order to relieve the pressure on the bottle being rolled off. Relieving this pressure avoids the possibility of incorrect label spotting due to a bottle's being out of alignment for spotting.

Air Prevents Label Jams

We provided an air jet to direct a low-pressure stream of air upward from below, hitting the underside of the label. This is to blow it up and out at the dispensing point and to keep it straight. Without this air, the label might roll or fold under—thus creasing it prior to its going into place around the cylindrical part of the bottle. Similarly, the sticky edge might also catch somewhere else on the label or bottle.

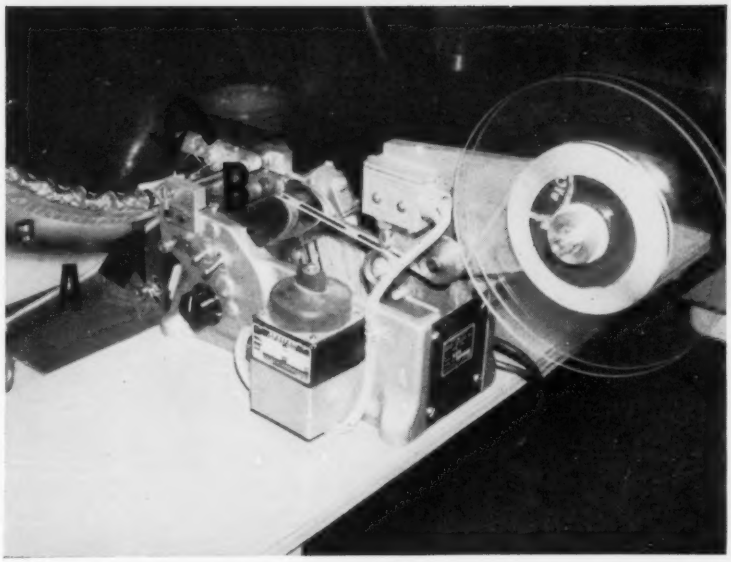


Fig. 2. Sliding down angle-iron trough above (A), each bottle reaches spotting point (B) where pressure-sensitive label automatically goes into place on narrow cylindrical area of end-most bottle. Once labels are spotted, bottles are discharged to conveyor—moving away from right to left. Essence of project is getting label into right place for easy manual smoothing.

Our operating speed for this label-spotting job is approximately 40/min. We can run faster or slower as a particular bottle size requires. To avoid frequent stopping for roll changes, we modified our

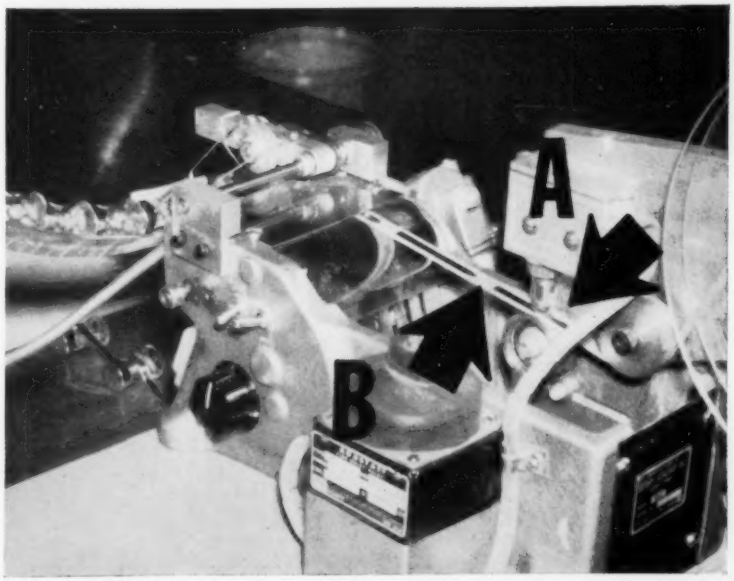


Fig. 3. Moving from roll at right, labels (on backing paper) pass Micro Switch (A) which senses a difference between thickness of paper and label (A), and thickness of backing paper alone (B) to actuate solenoid making roller move down on top of bottle. Dwell time interval provides enough delay time for label to go into place.

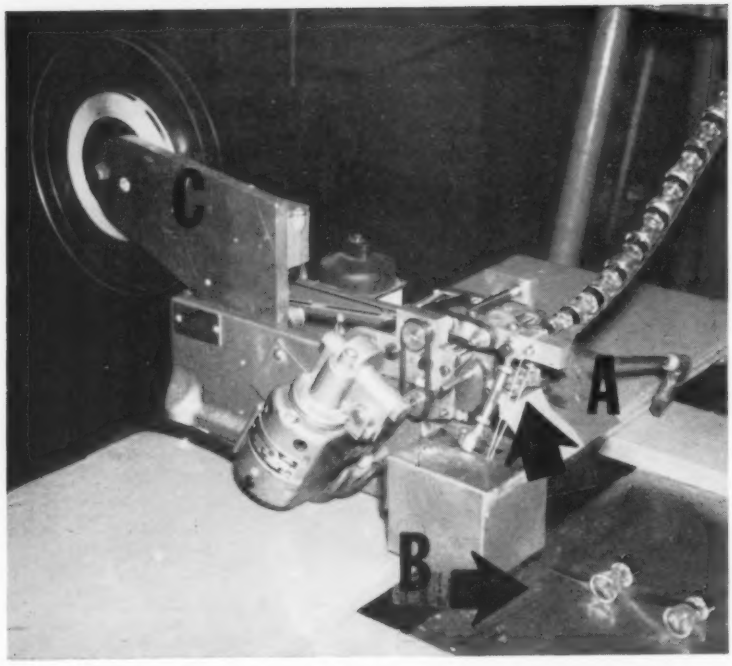


Fig. 4. Once label goes into place on bottle (A), labeled bottles move away (B) for manual smoothing of labels around bottles. Air jet directs low-pressure air upward to hit underside of label at point (A) to keep label straight. Otherwise it might catch while in motion. Plant experts modified label dispenser to hold production roll of labels by adding reel (C).

label dispenser in order to provide it with a reel capable of holding a production size roll of labels.

Getting Dwell Time

We found the space on the backing paper between labels did not allow a sufficient interval to provide adequate dwell time based on the actuation of the Micro Switch between labels. Therefore, we provided a time-delay mechanism in order to have adequate dwell time. It operates with the Micro Switch and solenoid and is adjustable for hold-down time. This is adjustable from bottle to bottle and provides a pause, or dwell, during which the label can be pressed into the desired position on the bottle.

Our time-delay switch permits critical adjustment by means of an eccentric on both rollers. This is to adjust the clearance at the Micro Switch. The adjustment feeder goes over both the discharging label and the backing paper. This backing paper itself goes over a bracket, into a waste container.

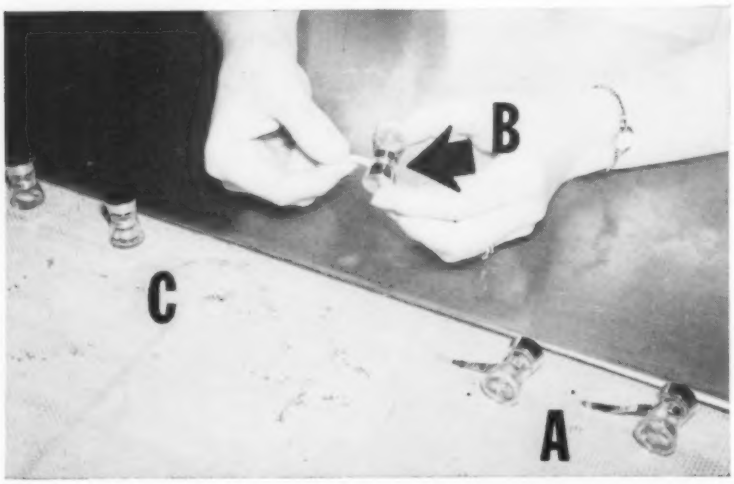


Fig. 5. Bottles (A) with labels spotted move from right to left on conveyor. Packaging crew members finish labeling by rolling each label in place around bottle (B), then return labeled bottles (C) to conveyor. Effective manual label finishing depends on correct machine spotting.

Girls Finish Labeling

Once the roller spots the label on the bottle and ejects the bottle to the conveyor, the bottle simply moves down this conveyor to stations where members of the packaging crew take each bottle and manually complete the positioning of its label. Once a label is correctly spotted by the machine they can do the completing job quite quickly, but without the correct spotting of labels, it would be difficult for them to do it at a production speed—because of the lack of tolerance space on the cylindrical area on each bottle. Having this mechanical help, they easily and quickly smooth, or roll, each label into position around the bottle. Completed packages can thus be accumulated and packed according to our normal procedures. *(End)*

Realistic mechanizing

Mr. Oglesby's combining of machinery with manual techniques highlights a significant packaging trend: More and more closing of the gap between strictly manual and largely mechanized packaging. This sort of resourcefulness permits combining the advantages of manual and mechanical packaging in applications unsuited to all-out mechanization.

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PROTECTIVE PACKAGING MATERIALS

Cushioning of packaged items

A study of optimum cushion design and cost, and practical design; converts energy units from cushion thickness basis to cost basis

By John A. Hoffman,
Chief, Customer Acceptance Laboratories, Research and Development, Kimberly-Clark Corporation, Neenah, Wisconsin

In the first part of this article, which appeared last month, Mr. Hoffman stressed that adequate cushioning can be attained by the fulfillment of two simple requirements, each expressed by a simple equation. Pointing out that there is a definite relationship between the force applied to a cushioning material and the energy it absorbs, he described two methods for determining this relationship. In this, the concluding part, he discusses the optimum cushion design, optimum cushion cost, and practical cushion design. He explains how energy units are converted from a cushion thickness basis to one based on cost, and describes a simple procedure for determining cushioning requirements for packaged items whose fragility is not known.

Adequate cushioning can be attained by the fulfillment of two simple requirements, each of which can be expressed by a simple equation. These equations, as discussed in Part I of this article, are:

$$E = W \times H \qquad (1)$$

and

$$F_m = W \times G \qquad (2)$$

We also discussed the definite relationship between the force applied to a cushioning material and the energy it absorbs. Two methods – static and dynamic – for determining the force-energy relationships of cushioning materials were described. Now we are ready to go into optimum design and cost, and practical design.

OPTIMUM CUSHION DESIGN

The energy units of the force-energy relationship are expressed in terms of cushion thickness, thus putting all cushioning materials on the same basis. We can put the *total energy* absorbed on this same basis by dividing Equation 1 by the cushion thickness, T. Thus,

$$E = \frac{W \times H}{T} \qquad (5)$$

Combining Equations 5 and 2, we eliminate the weight of the article. Solving each equation for W, we have, from Equation 5,

$$W = \frac{E \times T}{H},$$

and, from Equation 2,

$$W = \frac{F_m}{G}.$$

Therefore,

$$\frac{E \times T}{H} = \frac{F_m}{G}.$$

Solving for T, we have

$$T = \frac{H}{G} \times \frac{F_m}{E}. \qquad (6)$$

The relationship in Equation 6 tells us that:

1. The thickness required *increases* as the drop height *increases.*
2. The thickness required *increases* as the fragility factor *decreases* (the article is more fragile).
3. The thickness required *increases* as the ratio of force to energy, F_m/E, *increases.*

"Cushion Factor"

The ratio of force to energy, F_m/E, is a very important relationship in cushioning. It is sometimes referred to as the "cushion factor." The cushioning material with the lowest "cushion factor" is the most efficient (requires the least thickness).

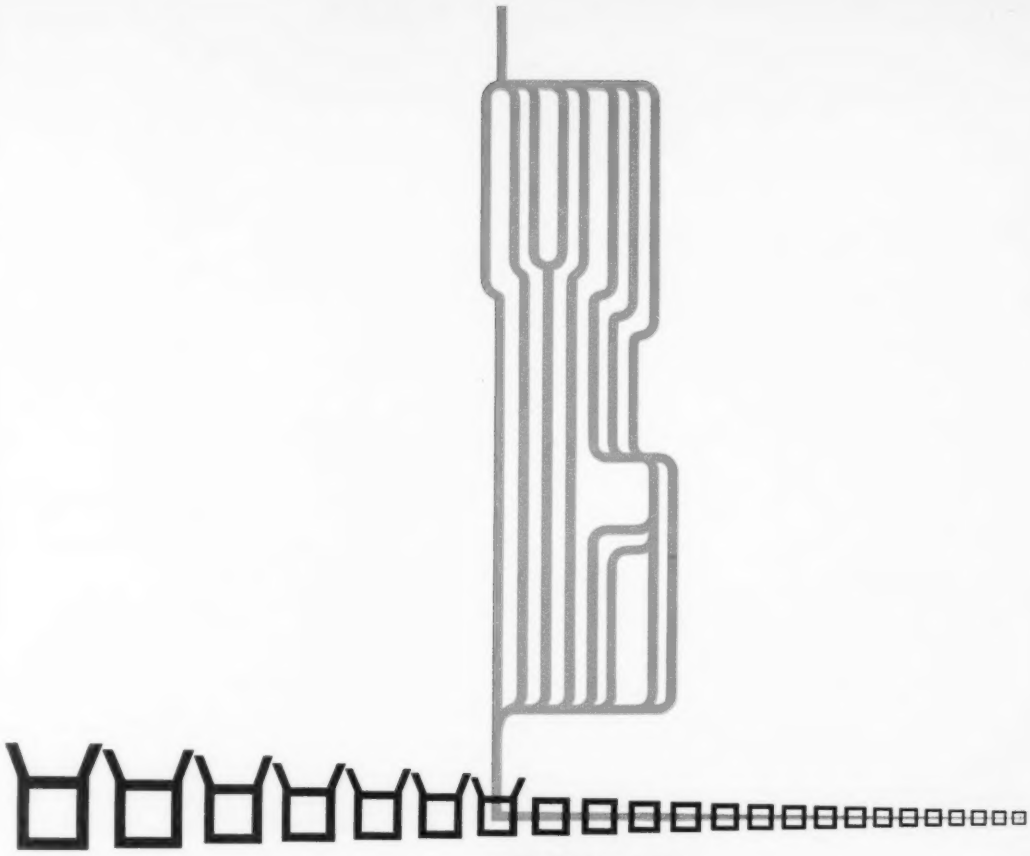
Let us examine the relationship between the force on the cushion and the force/energy ratio. The force-energy data from Table II* can be used to calculate these ratios which are shown in Table III.

Plot Force-Force/Energy Ratio. If we plot the force against the resultant force/energy ratio, (see Fig. 8) we find that, for this cushioning material, the ratio is a minimum at a force of approximately 0.30 lb/sq. in. Therefore, if the maximum force to which the packaged article can be subjected without being damaged is between 0.20 and 0.40 lb/sq. in., this particular cushioning material would be in use at its most efficient point.

Change Bearing Area

From Equation 2, we note that **the maximum force allowable is a function of the unit weight of the packaged article and its fragility.** It is difficult, if not impossible, to change the fragility factor of the packaged article, but it may be

*(*Editor's note: Tables I and II are found in Part I of this article which appeared in last month's issue.)*



POINT OF NO RETURN

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TABLE III

Relationship Between Force and Force/Energy Ratio of Cushioning Material

Total Force on Sample* (lb/sq. in.)	Total Energy Absorbed† (in.-lb/sq. in.)	Force/Energy Ratio (Cushion Factor)
0	0	0
0.10	0.015	6.7
0.20	0.038	5.3
0.50	0.086	5.8
1.00	0.138	7.2

*From column 1, Table II.
†From column 6, Table II.

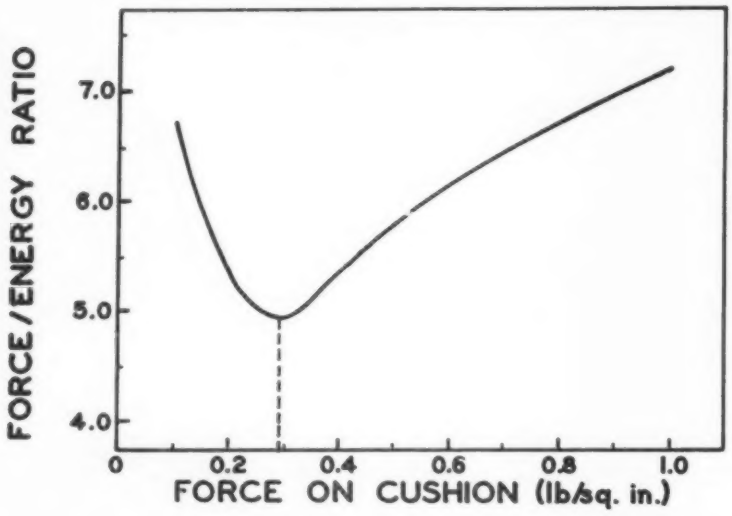

Fig. 8. Relationship between force on cushion and force/energy ratio of cushion. (Plotted from columns 1 and 3, Table III.) Note that ratio is minimum at force of approximately 0.30 lb/sq. in. Therefore, if maximum force packaged article can withstand is between 0.20 and 0.40 lb/sq. in., this material is being used at its most efficient point.

possible to change the unit weight by changing the bearing area on the cushioning material, since

$$\text{Unit wgt. (lb/sq. in.)} = \frac{\text{Article wgt. (lb.)}}{\text{Bearing area (sq. in.)}}.$$

Example. Assume that the cushioning material described by Fig. 8 is being used to package an article which weighs 1 lb., has a bearing area of 50 sq. in., and a fragility factor of 50 G's. Thus, $W = 1/50 = 0.02$ lb/sq. in., and $G = 50$.

Then, by Equation 2,

$$F_m = 0.02 \times 50$$
$$= 1.0 \text{ lb/sq. in.}$$

From Fig. 8, we see that the force/energy ratio for a force of 1.0 lb/sq. in. is 7.2. The thickness required of this cushioning material to protect the article against a 30-in. drop can be calculated by substituting these values in Equation 6 as follows:

$$T = \frac{30}{50} \times 7.2 = 4.3 \text{ in.}$$

If we could increase the *bearing area* of the packaged article to 100 sq. in. by the use of corrugated inserts or any other means, then $W = 1/100 = 0.01$ lb/sq. in. Using this value with the same fragility factor of 50 G's, by Equation 2, we have

$$F_m = 0.01 \times 50$$
$$= 0.50 \text{ lb/sq. in.}$$

From Fig. 8, at a force of 0.50 lb/sq. in., the force/energy ratio is 5.8. The thickness required now for protection against a 30-in. drop is, by Equation 6,

$$T = \frac{30}{50} \times 5.8 = 3.5 \text{ in.}$$

OPTIMUM CUSHION COST

Most investigators of the technical aspects of cushioning have placed their emphasis on design for minimum cushion thickness. This is a highly desirable practice since the use of the most efficient cushioning material at its most efficient point will certainly yield the minimum package cubage. However, there are certain practical aspects to be considered.

In the first place, it is often very difficult to adjust the bearing area of the packaged item so that the cushioning material is used at the minimum force/energy ratio. Unfortunately, for most materials, this point is at a lower force than the packaged item's fragility and/or unit weight will allow. It is difficult to increase the bearing area, and, in many cases, an increase in bearing area actually results in an increase in package cubage.

Includes Cost Factor

More importantly, those cushioning materials which are more efficient (low force/energy ratio) are also usually considerably more expensive. Therefore, from a practical standpoint, a measure of cushioning efficiency which includes the cost factor is useful and should be considered.

Referring back to Fig. 2,† we note that cushioning material A is considerably more efficient (absorbs more energy per inch of cushion thickness) than material B over the entire force range. It so happens, however, that material A is a great deal more costly than material B. The actual costs are:

A = \$0.30/sq. ft/in. thickness

B = \$0.08/sq. ft/in. thickness

The energy units of Fig. 2 can be converted from a cushion thickness basis to a cost basis as follows:

$$\frac{\text{Energy units/in. thickness} \times 144}{\text{\$/sq. ft/in. of thickness}} = \frac{\text{Energy (in.-lb.)}}{\$} \quad (7)$$

†(*Editor's note: For the reader's convenience, Fig. 2, from Part I, is reprinted elsewhere in this article.*)

Using Equation 7, the energy units were converted. Table IV lists these results for both cushioning materials, and shows a new force/energy ratio—one based on cost rather than thickness.

Fig. 9 is a plot of the Table IV data. It represents the relationship of "force" to the "force/energy" ratio expressed in terms of cost. This new type of "cushion factor" yields the point of minimum cushion cost. It is also apparent from Fig. 9 that cushioning material B, while less efficient than material A per inch of thickness, is actually a considerably better choice on a cost basis.

TABLE IV

Conversion of Energy Units to Yield New Force/Energy Ratio Based on Cost Rather than Thickness

	Cushioning Material A			Cushioning Material B		
Force*	Energy per Inch*	Energy per $†	Force/Energy per $	Energy per Inch*	Energy per $†	Force/Energy per $
2.5	0.7	336	0.0075	0.3	540	0.0046
10	3.0	1440	0.0069	1.5	2700	0.0037
20	5.0	2400	0.0083	2.5	4500	0.0044
30	5.8	2780	0.0108	2.8	5040	0.0060
40	6.1	2930	0.0137	3.0	5400	0.0074

*As plotted in Fig. 2.
†Calculated by Equation 7.

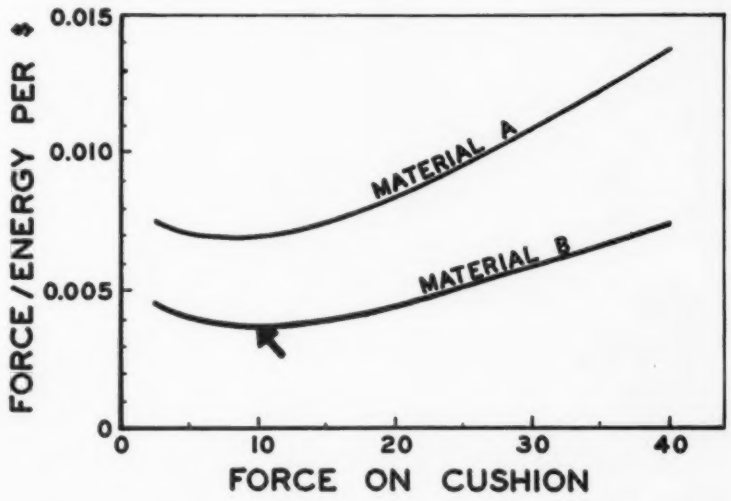

Fig. 9. Relationship between force and force/energy ratio expressed in terms of cost. (Plotted from Table IV, columns 1 and 4 for A; 1 and 7 for B.) This type of "cushion factor" yields point (arrow) of minimum cushion cost. Note that material B, while less efficient than A per inch of thickness, is considerably better choice on cost basis.

PRACTICAL CUSHION DESIGN

As we noted previously, there are a number of factors involved in determination of the thickness of cushioning material required for protection of the packaged item from shock damage. The necessary information includes:

Weight of the item
Areas of the cushioned faces of the item
The force-energy relationship of the cushioning material
The transportation hazards to which the packaged article will be subjected (maximum height of drop likely)
The fragility ("G" factor) of the packaged article

The first two of these, weight and area of the packaged article, are usually easily determined. The force-energy relationship of the cushioning material can also be established by the techniques previously described. However, the transportation hazards and the fragility of the packaged article are often not known and very difficult to determine.

Hazards Vary With Orientation of Package

The drop height from which the article is to be protected may be, and usually is, taken to be 30 in. This is the approximate distance from a truck tail-gate, a box-car door, or an individual's loaded arms to the ground. **The hazard varies with the orientation of the packaged item as it strikes the ground if dropped or thrown.** If the box lands on a corner, the shock is less than if it lands flat.

The fragility of the packaged article is not only a function of the magnitude of the force to which it may be subjected, but is also dependent upon the time duration of the force. An article may withstand a large force which is applied for a very short time and be damaged by a lesser force applied over a longer time period. It is beyond the scope of this article to cover all of the phases of packaged article fragility and package orientation in falling.

Build in safety hazard. We have assumed, and will continue to do so, that the fragility of the item is dependent upon the maximum force it will withstand, without reference to duration of the force, and that a 30-in. flat drop is expected. Since the effect of these assumptions is to maximize the transportation hazard, a built-in safety factor is provided.

In any event, we may be sure that **the fragility factor of the packaged item is not known in most cases. In my opinion, this is the major reason why the well-documented mathematical methods of cushion design are not widely used.** Most packaging engineers are designing from experience and by trial and error methods, using drop tests and shipping experience to establish the required thickness and type of cushioning material. This is a commendable and necessary practical procedure. However, it is often too time-consuming or expensive to screen the available cushioning materials and establish

(*Continued on Page 65*)

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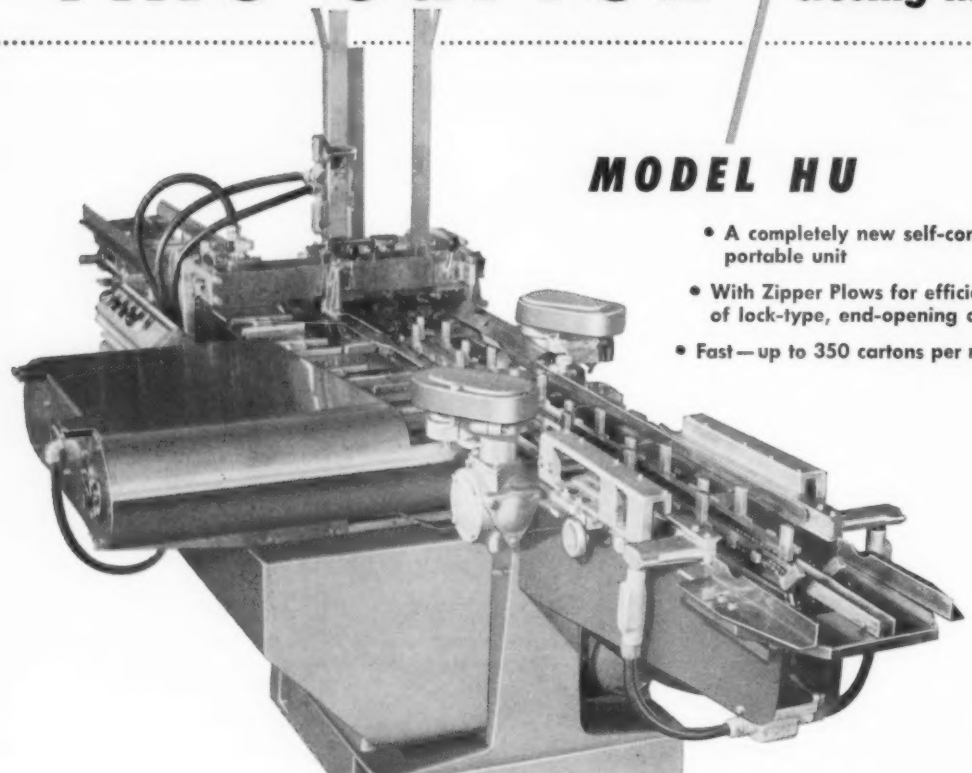

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Batchelder Engineering Co., Inc.	458-60	
Charles Beck Machine Corp.	854	Sheraton
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W. Braun Co.	940-44	Executive House
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Fibre Drum Manufacturers Assn.	934	Sheraton-Blackstone
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Follansbee Steel Co.	1137	Sheraton-Blackstone
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H. B. Fuller Co.	1005	Bismarck
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Gaylord Container Corp. Div., Crown Zellerbach Corp.	1128-30-34	Blackstone
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The General Packaging Equipment Co.	989	Palmer House
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Hours of the Exposition

Monday, April 13—10:00 a.m. to 6:00 p.m.
Tuesday, April 14—10:00 a.m. to 9:00 p.m.
Wednesday, April 15—10:00 a.m. to 6:00 p.m.
Thursday, April 16—10:00 a.m. to 6:00 p.m.
Friday, April 17—10:00 a.m. to 4:00 p.m.

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Here are the details on your

AMA Conference Program

American Management Association is holding its 28th National Packaging Conference April 13-15 at the Palmer House, Chicago. Following are the features of the program and the speakers discussing them.

Monday, April 13th,

10:00 a.m. to 12 noon. *Six company presidents appraise packaging from a top-management viewpoint:* J. C. Bowman, president, Bowman Biscuit Co., Div. of United Biscuit Co. of America, Denver, Col.; Lloyd Hale, president, G. H. Tennant Co., Minneapolis, Minn.; Marshall Lachner, president, B. T. Babbitt, Inc., New York, N. Y.; R. R. Newquist, president, Roots-Connersville Blower Div., Dresser Industries, Inc., Connersville, Ind.; Wallace L. Pierce, president, S. S. Pierce Co., Boston, Mass.; Foster B. Whitlock, president, Ortho Pharmaceutical Corp., Raritan, N. J.

Tuesday, April 14th,

Concurrent sessions:

9:30 a.m. to 12 noon. *Package design and package utility:* "New uses for aluminum," F. B. Newcomb, vice-president, commercial development, American Can Co., New York, N. Y.; "Horizons for aerosols," R. J. Hennessy, department head, packaging development, Lederle Laboratories Div., American Cyanamid Co., Pearl River, N. Y.; "Re-design economies—the Westinghouse 'wring-out'", Harold J. Anderson, packaging research engineer, headquarters, manufacturing planning, Westinghouse Electric Corp., Pittsburgh, Pa.; "Display card packaging," Dr. J. A. Keenan, president, Standard Packaging Corp., New York, N. Y.

9:30 a.m. to 12 noon. *Manufacturing and handling:* "Picking and packing service parts, F. H. Wiley, general supervisor, materials handling research, International Harvester Co., Chicago, Ill.; "Military packaging requirements," Albert V. Grundy, director, container div., Quartermaster Food & Container Institute for the Armed Forces, Chicago, Ill.; "New concepts for production control," Leland R. Srigley, superintendent, finishing div., Parke, Davis & Co., Detroit, Mich.; "Engineering a new package," Stanley Mantell, manager, production planning, Royal McBee Corp., Hartford, Conn.

Wednesday, April 15th,

Concurrent sessions:

9:30 a.m. to 12 noon. *Persuaders on parade:* "Prestige packaging for fine foods," Joseph B. Starke, manager, Gourmet foods operation, General Foods Corp., White Plains, N. Y.; "New look for housewares," J. J. Culberg, vice-president, houseware sales, Ekco Products Co., Chicago, Ill.; "Toiletries and cosmetics packaging," Warren B. Dubin, brand manager, Chesebrough-Pond's, Inc., New York, N. Y.; "Packaging drugs today," John Deal, advertising manager, The Upjohn Co., Kalamazoo, Mich.

9:30 a.m. to 12 noon. *Industrial goods go to market:* "New containers for chemicals," Robert D. Minteer, manager, packaging development, Monsanto Chemical Co., St. Louis, Mo.; "Rail shipment problem solving," C. R. Anderson, director of container & loading research, Research Center, Association of American Railroads, Chicago, Ill.; "Industrial tapes applications," W. C. Larsen, manager, tape customer engineering dept., Minnesota Mining & Manufacturing Co., Lewis J. Shioleno, general manager, electronics div., Erie Resistor Corp., Erie, Pa.

(Conference registration fee $18.00 each person for AMA members, $24.00, non-members, for full conference; for single day session, $7.00 each, AMA members, $10.00, non-members.)

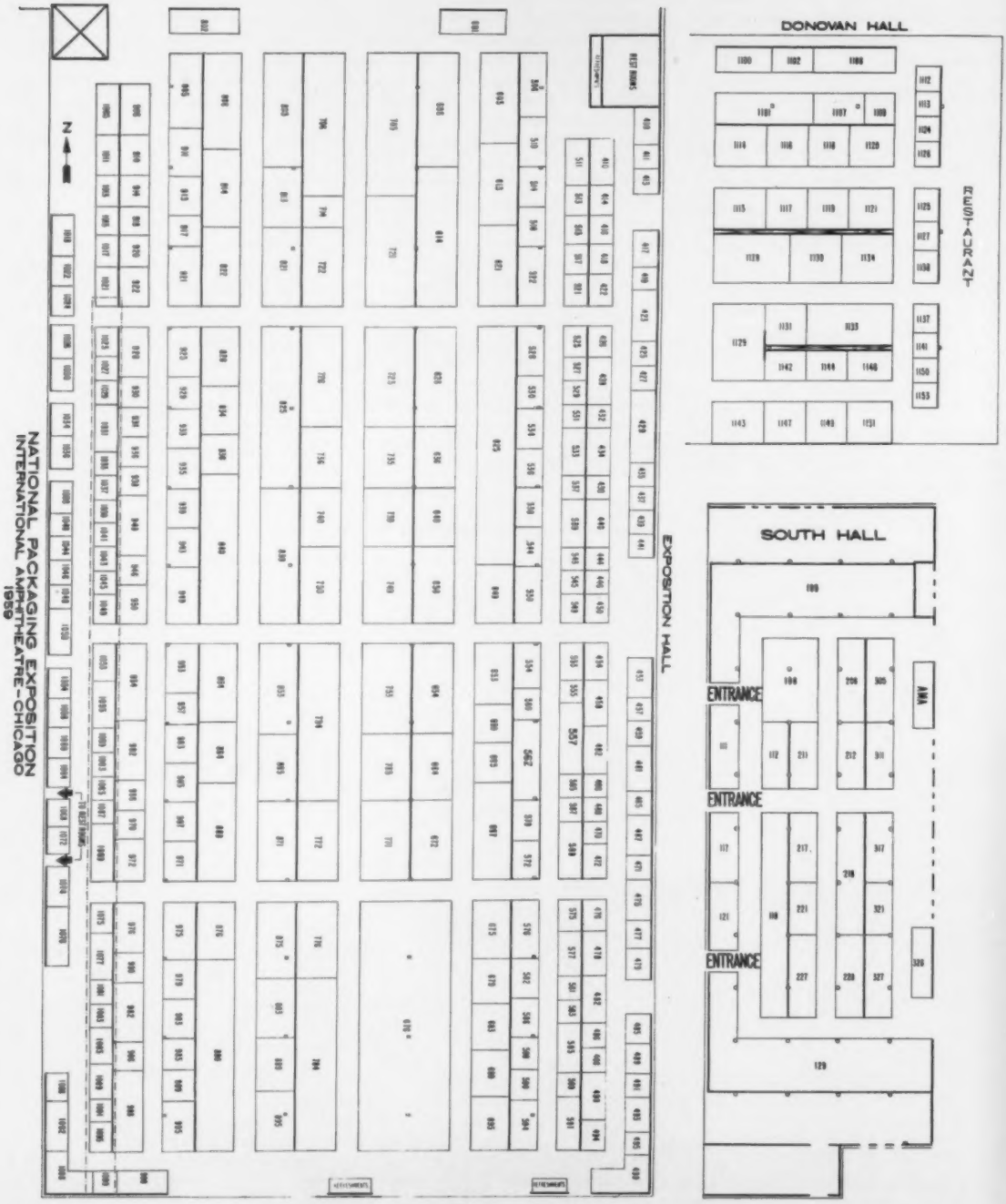
Signode Steel Strapping Co.	217	
The Simco Co.	518	Conrad Hilton
Simon Adhesive Products Corp.	1063	Conrad Hilton
Simplex Binder Co.	457	Palmer House
Sinclair & Valentine Co.	765	Palmer House
H. P. Smith Paper Co.	453	Stock Yard Inn
Soabar Co.	1054	Conrad Hilton
Socony Mobil Oil Co., Inc.	467	Congress
Sohn Machine Co.	1143	LaSalle
Southern Adhesives Corp.	735	
Speedry Products, Inc.	1040	Conrad Hilton
Spencer Chemical Co.	875	LaSalle
Standard Plastics, Inc.	1124	LaSalle
Stanford Engineering Co.	311	Palmer House
Stanley Steel Strapping Div., Stanley Works	1115	Lake Shore Club
E. J. Staude Manufacturing Co., Inc.	1099	LaSalle
Stein, Hall & Co., Inc.	976	Shore Drive Motel
Sten-C-Labl Inc.	1083	
Sterling, Fleischman Co.	438	Webster
Stoffel Seals Corp.	918	Conrad Hilton
H. L. Stoker Co.	1039	Conrad Hilton
Strap-All Sales, Inc.	1085	Morrison
Sun Chemical Corp.	839-49	Morrison
Swift & Co., Adhesive Products Div.	576	Congress
Syntron Co.	967	LaSalle
Technical Tape Corp.	1017	
Thilmany Pulp & Paper Co.	1129-38	Conrad Hilton
Thomson National Press Co., Inc.	1031-33	
Tipper-Ties Products of N.J. Inc.	466	Palmer House
Toledo Scale, Div. of Toledo Scale Corp.	665	Sherman
Tompskins' Label Service	112	Sheraton
Triangle Package Machinery Co.	876	Oak Park Arms
Tri-State Plastic Molding Co.	411	Midland
Tri-Wall Container, Inc.	1069-71	Bismarck
Tronomatic Machine Manufacturing Corp.	485	50th on the Lake Motel
Union Bag-Camp Paper Corp.	840-44-50	Palmer House
Union Carbide Corp.	749	
Union Paste Co.	735	Conrad Hilton
Union Steel Products Co.	672	Palmer House
Unit Portions, Inc.	1035	
U.S. Bottlers Machinery Co.	971	Palmer House
U.S. Industrial Chemicals Co.	835	Sheraton
U.S. Printing & Lithograph Co.	106-205	Sheraton-Blackstone
U.S. Steel Corp.		
U.S. Steel Products Div.	943	
U.S. Steel Supply Div.	988-94	
Vac-Tie Fasteners, Inc.	537	Bismarck
Varigraph Co., Inc.	414	Morrison
B. Verner & Co., Inc.	995	LaSalle
Vertrod Corp.	425	Palmer House
John Waldron Corp.	970	Bismarck
S. D. Warren Co.	305	Chicago Athletic Club
Web Controls Corp.	1074	
Weber Addressing Machine Co., Weber Marking Systems Div.	1049	
Webster Equipment Co.	930	
West Instrument Corp.	416	
West Virginia Pulp & Paper Co.	805	Conrad Hilton
Weyerhaeuser Timber Co.	979	Palmer House
Wolverine Paper Converting Machinery Corp.	1027	Shoreland
Wood Conversion Co.	802	Conrad Hilton
Wrap-O-Matic, Rosental Manufacturing Co.	567	
Wright Machinery Co.	526	Sheraton
Wyomissing Paper Products	980	Conrad Hilton
J. G. Yahnke Co.	465	Conrad Hilton
York Tape Printers, Inc.	575	Congress

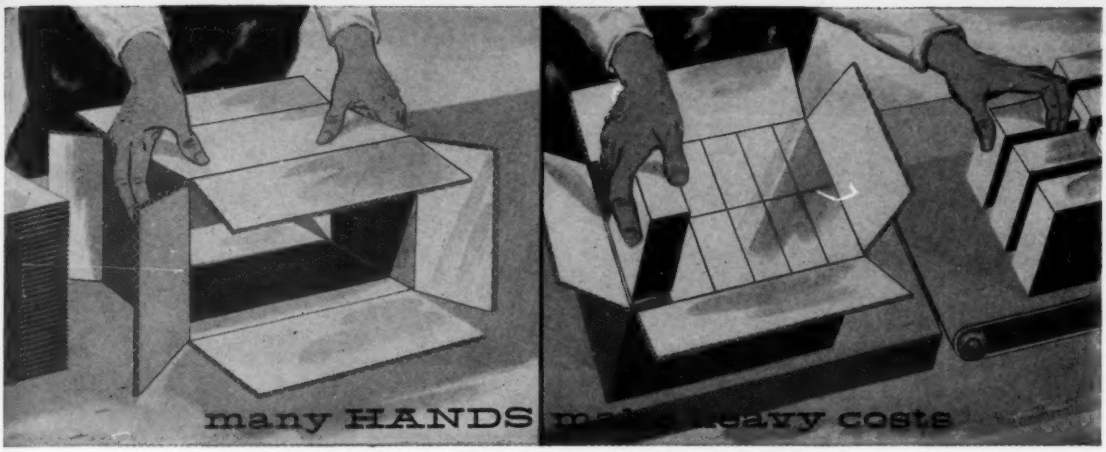
Remember—the conference is "downtown" and the show is at "the stockyards".

Conference location:
The Palmer House, on Monroe Street between State Street and Wabash Avenue.

Show location:
The International Amphitheatre, on South Halsted Street at West 42nd Street.

Floor plan of booth locations at AMA National Packaging Exposition





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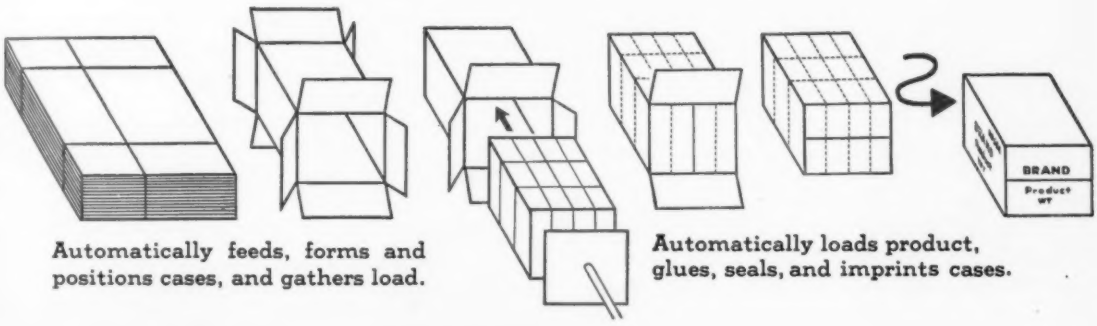
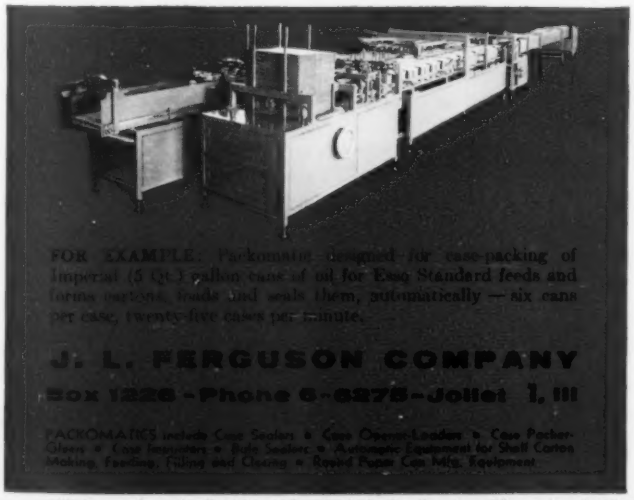


Automatically feeds, forms and positions cases, and gathers load.

Automatically loads product, glues, seals, and imprints cases.

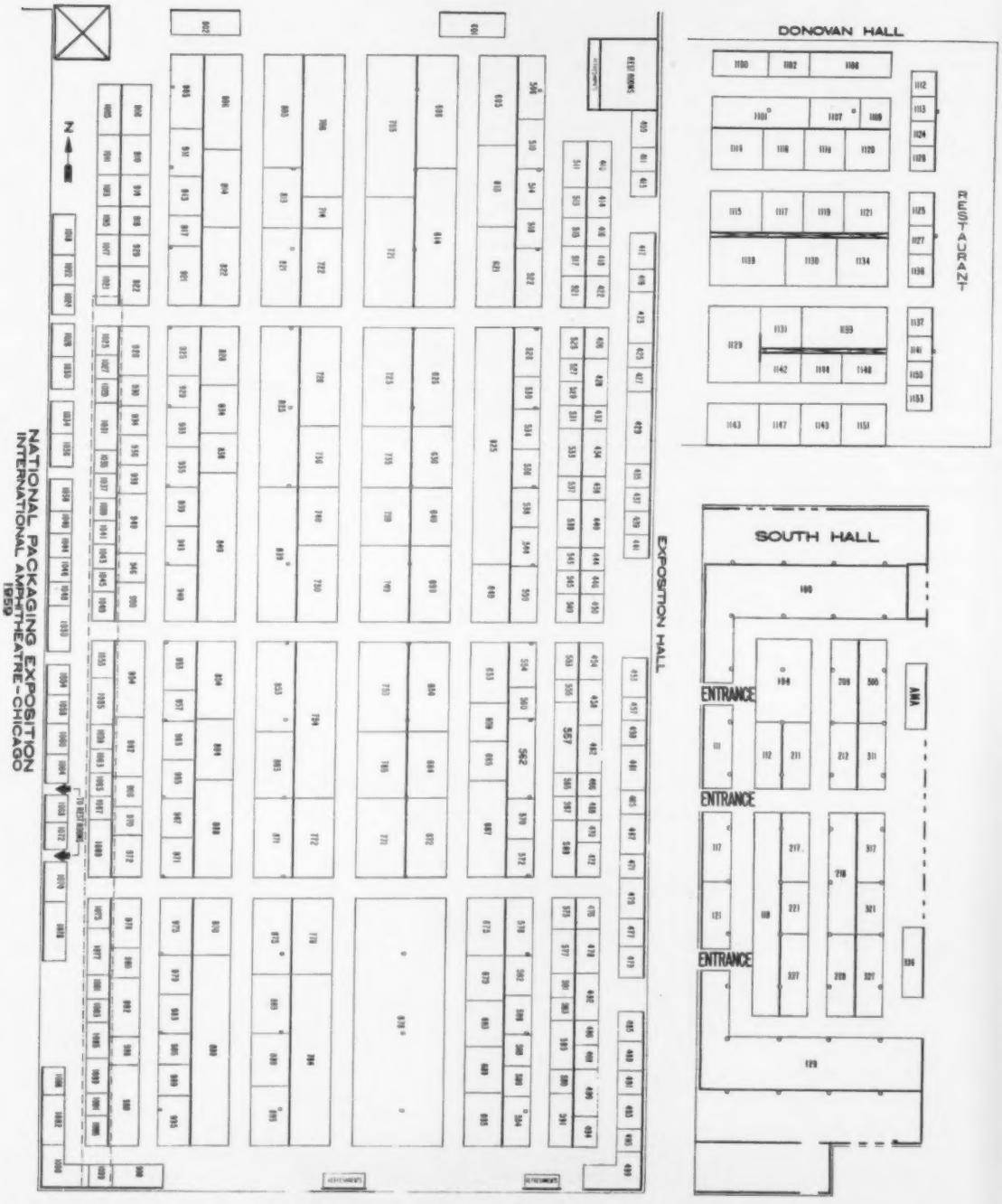


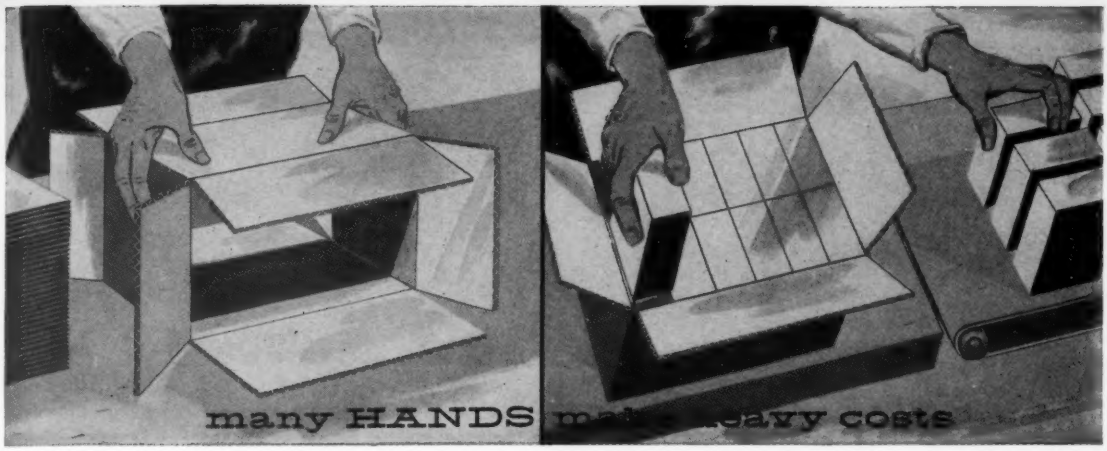
For casing round, square, rectangular or free-form packages of virtually any size

You need not be a **big** company to enjoy the economies of Packomatic equipment. If your volume requires even one person to hand-form cases, hand-fill, hand-seal, or hand-imprint them, then a Packomatic machine can be a sound investment. Only a minute or two of attention at infrequent intervals is needed even for a **complete** automated Packomatic **line,** capable of matching the output of a dozen pair of hands. And in addition to reducing direct labor production costs Packomatic can, by utilizing end-opening shipping cases, reduce your paper-board costs up to 25%. And mechanically end loaded cases are stronger because the flaps give added resistance to weight and shock. In addition they stack better because their uniformly flat sides enables keying of pallet loads. Write, wire or phone us for facts on how to reduce your case packing costs.

Visit our booth #649 at the A.M.A. Packaging Show April 13-17 at Chicago's International Amphitheatre.

Floor plan of booth locations at AMA National Packaging Exposition





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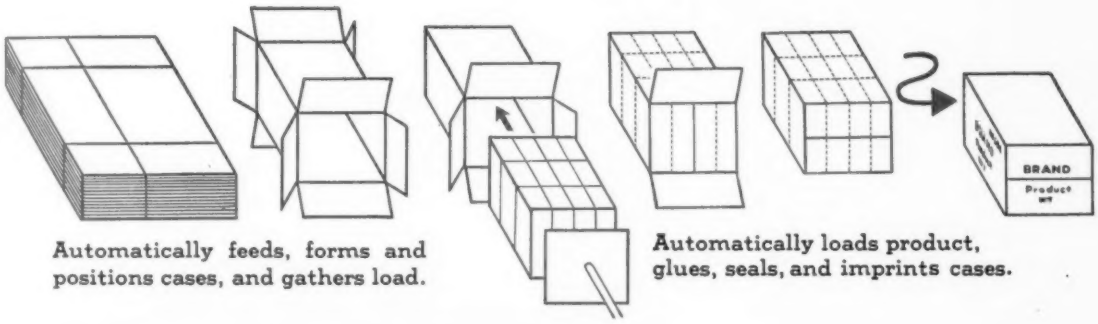
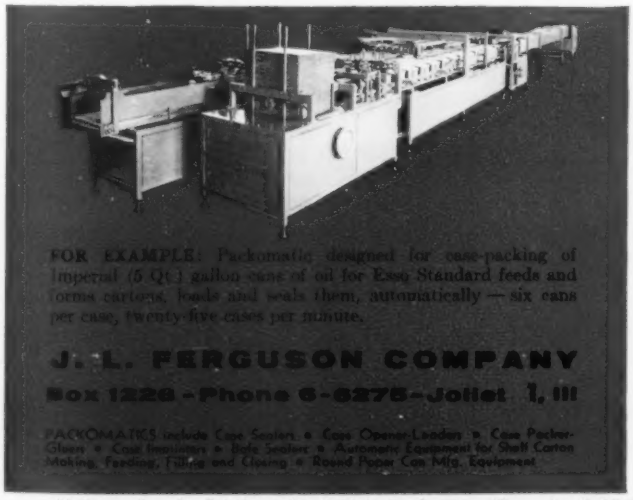


Automatically feeds, forms and positions cases, and gathers load.

Automatically loads product, glues, seals, and imprints cases.



FOR EXAMPLE: Packomatic designed for case-packing of Imperial (5 Qt.) gallon cans of oil for Esso Standard feeds and forms cartons, loads and seals them, automatically — six cans per case, twenty-five cases per minute.

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For casing round, square, rectangular or free-form packages of virtually any size

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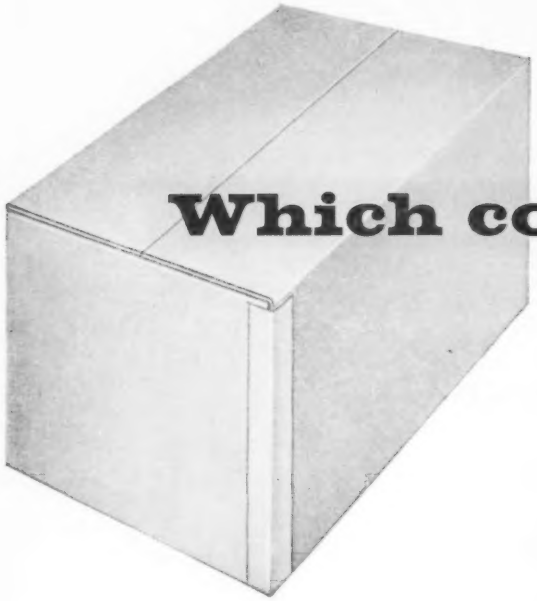
What you should know about "manufacturer's joints" in Union Boxes.



Which corner of a box

One corner is more important than the rest: where your corrugated shipping container is held together. This "hinge", or manufacturer's joint, often holds the key to your box's performance.

As the illustrations show, manufacturer's joints comprise three basic types: taped, stitched, and glued-lap. Each does a special job. Knowing which to use, and when, calls for a detailed analysis of your product and how it will be shipped.

Union Box engineers will be glad to make such a study for you. This is part of Union's complete structural design service. These fundamentals, however, are excellent guides:

Many shippers prefer tape

Taped Joint
(outside)

Tape is generally gum-backed, reinforced kraft paper or cloth, having high tear strength, especially in the lengthwise direction. Tapes are 2, 2½ and 3 inches wide and come in varying grades depending on degree of strength required.

For more information circle No. 239 on Reader Service Card

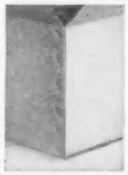
x should you examine first?

Advantages: no projections. In stacking, boxes lie flat, rock less. Also, entire interior area of box can be used. The taped joint is continuous, too . . . seals out dust and dirt. And it folds to make a true box corner.

On the other hand, tape is frequently more expensive than other manufacturer's joints. It can be adversely affected by moisture also. In some cases, tape may interfere with printing.

The sturdy stitch

Frequently used for heavy items like canned goods, this joint uses steel staples driven from the outside of the box panel. It is probably the strongest "hinge", gives the most positive closure, and is not affected by moisture or cold. It is usually the least expensive.



Stitched Joint (outside)

The closure, however, is not continuous. And, since the metal stitches may protrude inside the box, this joint is normally not recommended for fragile and prone-to-scratch articles.

The diagonal stitched joint shown is a typical arrangement. Others include vertical, horizontal, and double stitching.

Glued lap . . . the versatile joint

Flap may be adhered either to the inside or outside of the box, and to the end or side panel. Inside-flap gluing is the most popular. It is the only joint which leaves a completely uninterrupted exterior printing surface.

Like the taped joint, the glued lap joint is continuous . . . forms a true fold. Performance under adverse moisture conditions is questionable. Also, inside-lap does not give 100% clear inside-packing area.

Glued Lap Joint (inside)

Take full advantage of Union's accumulated knowledge in constructing and recommending manufacturer's joints for shippers in every industry. Consistently well-engineered features such as these offer the surest protection for your product and your shipping investment.

Write for Union's free, informative booklet "Manufacturing Corrugated Boxes."

union camp

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Western Division—4545 W. Palmer, Chicago, Ill.

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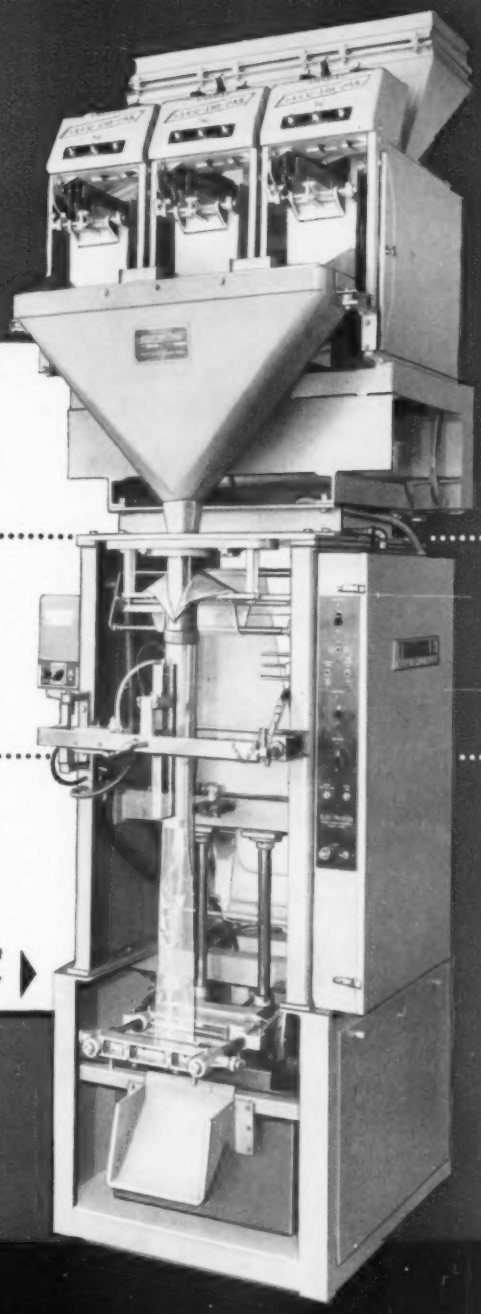
EXTRA HIGH SPEED



55 to 60 3-ounce packages per minute:—coffee, pouch paper.

50 to 55 8-ounce bags per minute:—elbow macaroni, cellophane.

40 to 45 1-pound bags per minute:—pinto beans, polyethylene.

The L-2 can be equipped with net weight scales (as shown) volumetric filling head, or for hand loading.

See *why* Triangle's new design means: (*1*) Higher Speeds (*2*) Simplicity of Operation (*3*) Fast, easy changeover for different bag sizes, materials and products.

Send for three dimensional color slides and viewer—study the L-2 at your leisure—no obligation, we pay the postage both ways.

FILL IN THE COUPON—MAIL IT TODAY

YES MR. TRIANGLE—I would like to see the 3-D color slides of the Automatic Bag Maker, Filler and Sealer. Send it to me Postage Paid, Both Ways.

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TRIANGLE

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Chicago 35, Illinois

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Dutch Brand Strapping Tape multiplies many times the weight a package can carry . . . keeps goods safe during shipment. Tough vinyl backing and strong glass strands give this strapping tape a tensile strength of 270 pounds per inch of width.

One man can apply Dutch Brand Strapping Tape with a simple hand dispenser. The pressure-sensitive adhesive holds quickly, even on irregular surfaces . . . permits using short strips instead of wrap-around lengths. Dutch Brand Strapping Tape comes from the roll cleanly, without splits. Resists abrasion. Not effected by rot, water, oil, or grease. Can be imprinted if you wish.

Investigate Dutch Brand Strapping Tape. See how it saves time on the line—saves work in packaging, palletizing, and bundling – saves money. See why it makes an ideal "tear-strip." Write today for new "idea book" giving dozens of profitable uses.

JOHNS-MANVILLE DUTCH BRAND DIVISION
7800 S. Woodlawn Avenue, Chicago 19, Illinois

JOHNS-MANVILLE JM PRODUCTS

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For more information circle No. 241 on Reader Service Card

Why did The Carborundum Co. pack their Scouring Sponges in Food Board?

The Carborundum Co. makes no claim about the palatability of their scouring sponges —yet they are packaged in Crossett Bleached Food Board.

Why?

While Crossett board has all of the necessary requisites for a top grade food container, it offers plus features that make it highly useful for broader applications.

In this case, Lawless Folding Box of Tonawanda, N.Y. selected our stock because its greater strength permitted use of lower caliper for weight and space saving and because of its superior bending properties and its white, bright two-side printing surface.

How sure are you that you are packaging nothing that Crossett Food Board can do better?

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A DIVISION OF THE CROSSETT COMPANY

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the material which yields optimum thickness or optimum cost.

G-Factor Of Article Not Known

A major purpose of this article is to provide the packaging engineer or purchasing agent with a simple, practical method for determination of cushioning material thickness when the packaged article fragility factor is not known. This method is based on a knowledge of the force-energy relationships of cushioning materials and the successful performance of some material.

These force-energy relationships may be established by the simple, small-scale impact test method previously outlined. They also may be calculated from static force-compression data provided by suppliers or independent laboratories. **It is important that the same method be used for all cushioning materials examined.** Establishing the successful performance of a cushioning material can be done by the trial and error methods of drop testing or trial shipments.

Example. Assume that we are currently using material A of Fig. 2 to cushion an article which weighs 6 lb. and has a cushioned face area of 24 sq. in. We have established through trial or regular shipments that the cushioning material must be 2.5 in. thick to prevent damage to the packaged article. We do not know the "G" factor of the packaged item, but wish to know what thickness of cushioning material B would provide equivalent protection from a 30-in. drop as material A is now providing.

From Equation 1, the maximum total energy to be absorbed by the cushion is

$$E = W \times H \qquad (1)$$

Inserting the values in the example above, we have

$$E = \frac{6}{24} \times 30$$

$$= 7.5 \text{ in.-lb/sq. in.}$$

Since the thickness of cushioning material A currently being used is 2.5 in., the maximum energy being absorbed *per inch* of thickness is 7.5/2.5 or 3 in.-lb/sq. in.

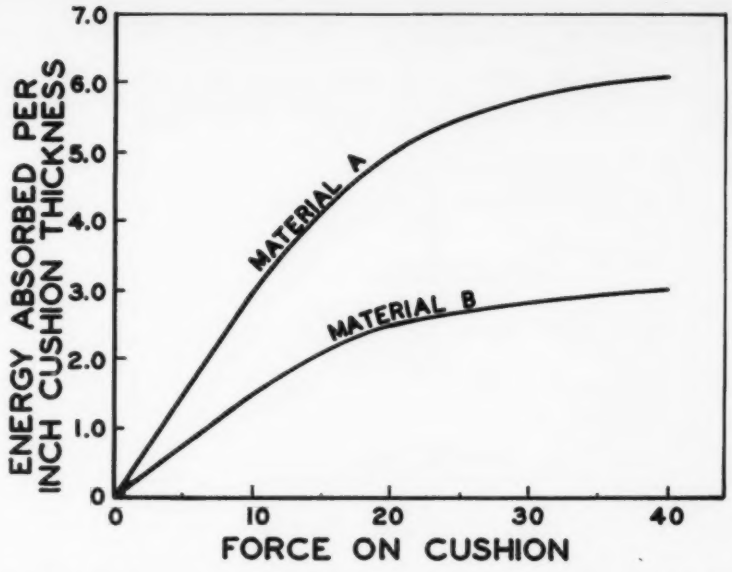

Fig. 2. Typical force-energy relationships for two different types of cushioning material. For any cushioning material, there is a definite relationship between force applied to it and energy it absorbs. Note that approximately twice as much thickness of material B would be required for most situations since it absorbs only half as much energy *per inch of thickness* as material A.

From Fig. 2, for material A, 3 energy units (in.-lb/sq. in.) correspond to a force on the cushion of 10 force units (lb/sq. in.). At this maximum allowable force, cushioning material B will absorb only 1.5 energy units per inch of thickness. Since a total of 7.5 energy units must be absorbed (Equation 1), 7.5/1.5 or 5 in. of cushioning material B would be required.

The "apparent" G factor of the packaged article can be calculated by Equation 2 as follows:

$$F_m = W \times G \qquad (2)$$

$$10 = \frac{6}{24} \times G$$

$$G = 40$$

SUMMARY

Interior packaging materials are often used to cushion packaged articles, thus providing protection against the shock hazards of transportation and handling. **Adequate cushioning can be obtained by fulfillment of two requirements:**

1. The cushioning material must absorb the energy developed by the falling article. ($E = W \times H$)
2. The maximum force on the cushioning material must not exceed the force required to damage the packaged article. ($F_m = W \times G$)

For any cushioning material there is a definite relationship between the force applied to it and the energy it absorbs. The most efficient material absorbs the most energy per inch of cushion thickness when the maximum allowable force is applied to it. **A knowledge of this force-energy relationship is essential to cushion design work.**

Methods

Several methods of determination of this relationship are described. There is a **static** method involving placement of weights on the cushion and measurement of the resultant degree of compression. **Dynamic** methods are more desirable and involve dropping known weights from measured heights on the cushion. A simple, small-scale dynamic testing instrument is described.

Consider Minimum Force/Energy Ratio

For each cushioning material there is a certain point of force application at which it is most efficient. This is the point at which the ratio of force applied to ener-

(*Continued on Page 110*)

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210 Mississippi St.

Seattle, Washington
Duncan Equipment Co.
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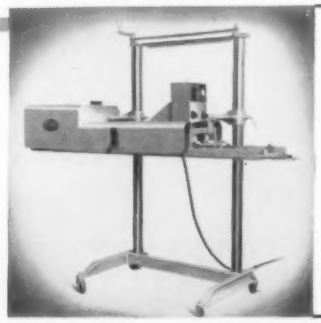

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Fig. 1. New "crown-and-cap" bottle (left) — easy and safe to handle — and old ampul — dangerous and difficult to handle.

Double closure for chemicals

Eliminates safety hazard on packaging lines
Assures maximum purity and longer shelf life
Results in lower packaging and shipping costs

By Robert W. Kreinest,
Division Manager,
Matheson Coleman & Bell,
Div. of The Matheson Company, Inc.,
Norwood, Ohio

Highly corrosive chemicals and those sensitive to the atmosphere present some complicated packaging problems, among them being dangerous safety hazards and excessive packaging costs. Describing these problems and his company's packaging research to overcome them, Mr. Kreinest explains how it came to use the "crown-and-cap" bottle for these products.

Providing a positive, air-tight seal for a glass bottle containing a highly corrosive liquid chemical or one sensitive to the atmosphere has solved many of our packaging problems. Not only has it eliminated a most dangerous safety hazard on our packaging line, but it is much safer for the ultimate user of the product. Also, it assures us of maximum purity, longer shelf life, and lower packaging and shipping costs.

Termed the "crown-and-cap" bottle, it is an amber bottle which takes a standard sized, plastic screw cap plus a crown-type closure which fits under, and is completely hidden by, the outer cap; thus, a double seal. (See Fig. 1.)

Provides Atmosphere-Tight Seal

This type of double closure was developed and put into use for two reasons:

(1) It provides an atmosphere-tight seal for highly purified laboratory chemicals which are affected by oxygen, (2) because of its tight sealing properties it enables us to pack highly corrosive liquids in a more generally used type container than the ampul which we used formerly.

With the tight holding qualities of a crown cap, almost any type of liner (providing it is not attacked by the chemical packaged) can be used to seal the bottle completely and prevent its contents from coming in contact with the outside atmosphere. For corrosive liquids, we use a teflon liner inserted under the crown cap, and the cap's sealing action prevents the contents of the bottle from contacting anything but glass and teflon.

Make Tests

Over the years, we have conducted numerous tests in an attempt to overcome the problems resulting from the fact that a regular amber bottle with a screw cap can not be sealed completely from the atmosphere, especially for items with high vapor pressures. One such test was to package an atmosphere-sensitive liquid with an inert gas such as argon or nitrogen to serve as a blanket between the bottle contents and cap. *(Turn page)*

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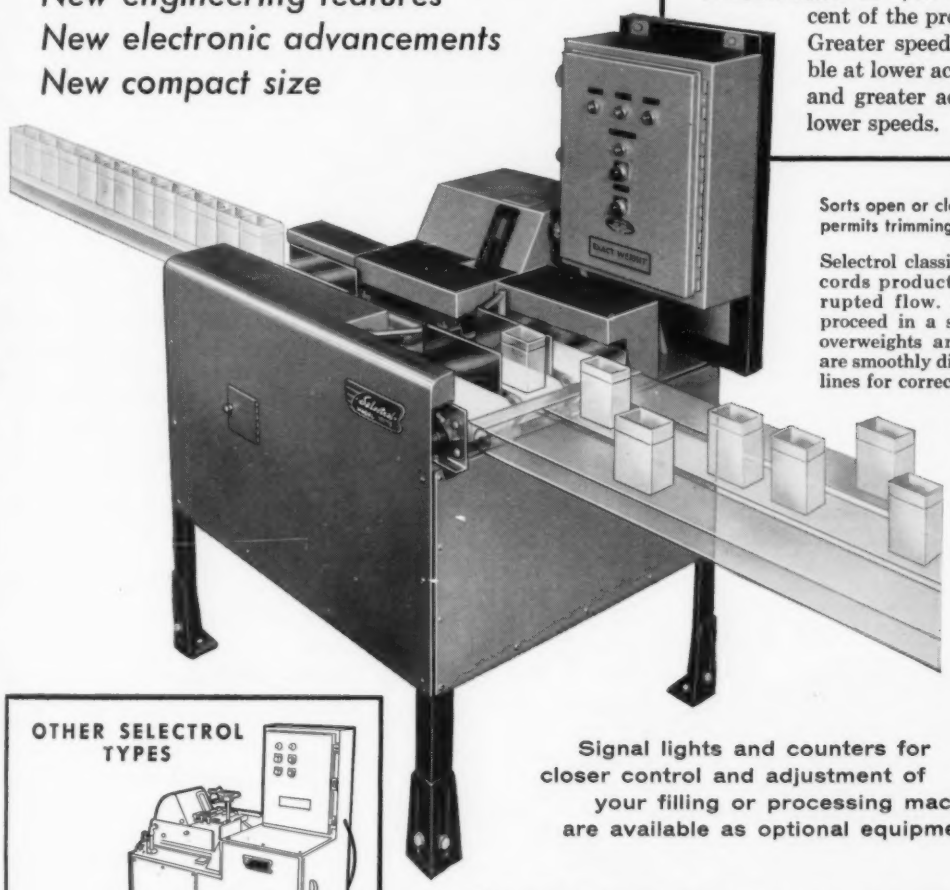

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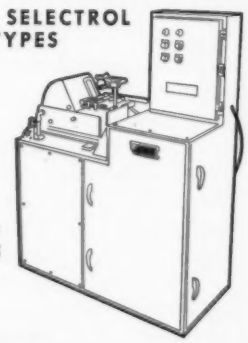

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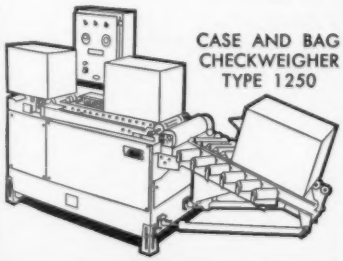

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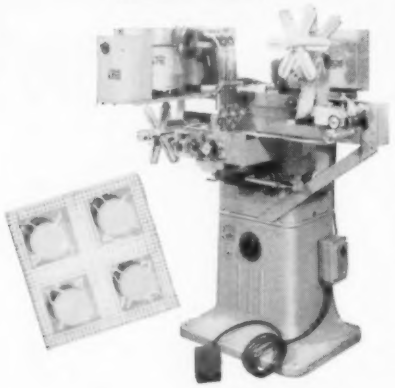

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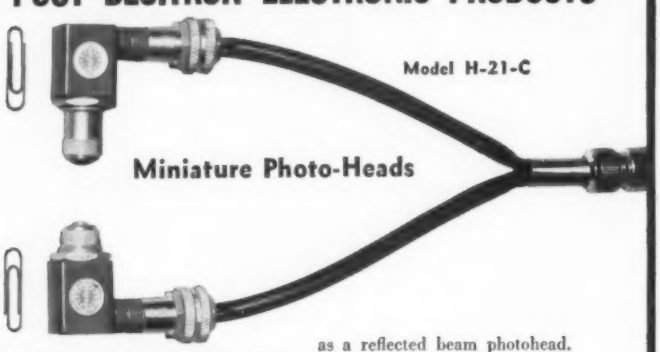

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Since the molecular activity of any gas is considerably more than the molecular activity of most liquids, we found that the argon and nitrogen leaked occasionally. There is no leak detection test satisfactory for the gases that we wished to use. Thus, the results of our tests were negative.

Poor Seal Causes Contamination

Many of our regular products, such as chlorosulfonic acid, thionyl chloride, acetyl chloride, hydrazine, etc., are highly corrosive. These will attack plastic caps. To introduce a teflon liner between the chemicals and a regular screw-type plastic cap is frequently a stop-gap that is only 80 per cent effective. **A very slight fold in the teflon when the cap is screwed on the bottle (and this could occur easily) permits fumes of the corrosive liquid to escape and attack, and eventually soften, the cap.**

Fig. 2 shows two bottles filled with such a chemical, which have been stored for over a year. The left one has a crown cap under the plastic screw cap, while the right one does not. Note the difference in appearance between the screw caps—the right one is badly corroded. **Corrosion of the plastic cap (without crown cap) may begin within two weeks after filling. This time period depends on the specific chemical packaged.** This causes the material to be contaminated, and makes it unsafe to ship.

Our problem was finally complicated by having liquids with high vapor pressures, such as ethyl mercaptan and acetaldehyde. These liquids escape easily from a screw-cap bottle and the customer frequently received a partially full or completely empty bottle. This was particularly true when shipments were made in the summer months to the southern part of this country, or, worse, to equatorial regions.

Turn To Ampul

As a solution to these problems, we turned to a glass ampul for many of our products. Although

Fig. 2. "Crown-and-cap" (left) with teflon liner prevents plastic cap corrosion after storage for over a year. Bottles were filled with highly corrosive liquid. Corrosion of plastic cap, without crown cap, (right) may begin within two weeks after filling, depending on specific chemical packaged.

it provides a completely tight seal, preventing any corrosive fumes and liquids with high vapor pressures from escaping, it presented problems of its own.

Is safety hazard. Most of the materials which we packaged in ampuls are highly flammable as well as volatile. Since the only method of sealing the glass neck of an ampul is by open flame, it presented a safety hazard on our packaging lines. We overcame this situation by reducing the temperature of the contents to about –60°C., rendering the material inactive and then carefully flame-sealing the unit. At best, however, it was still a dangerous procedure. Fig. 3 shows one of the glass ampuls being flame-sealed.

Slows packaging operation. Thus we had, in a fashion, solved all of our bad packaging problems by using glass ampuls. But, they slowed down our filling operation, made it necessary to use flame-sealing on flammable materials, and caused us to adjust our entire stockroom and shipping procedures to the odd size and fragility of the large ampul. Remember, we were not using ampuls in the range of 10 to 60 cc., but ones which contained 22 and 34 oz. The expense and hazard were tremendous.

Change To New Closure

With our introduction of the crown-and-cap bottle, we have eliminated so many of these problems. This type package assures us that our atmosphere-sensitive materials remain blanketed with inert argon or nitrogen within the unit, under any conditions. This feature has been particularly important in regard to spectroscopic reagents, amines, hygroscopic chemicals, and materials which have a tendency to form peroxides if not in an inert atmosphere.

Although the ampul prevented fumes of corrosive liquids from escaping, it was extremely costly as compared to the crown-and-cap container. Likewise was the case in packaging liquids with high vapor pressure.

Advantages. The advantages of

Robert W. Kreinest received his B.S. in chemistry from Villa Madonna College, Covington, Ky. Prior to joining Matheson in 1953, he was in the analytical control department of Schenley Distilleries, Inc., Lawrenceburg, Ind. In his present position, he is concerned chiefly with production and packaging.

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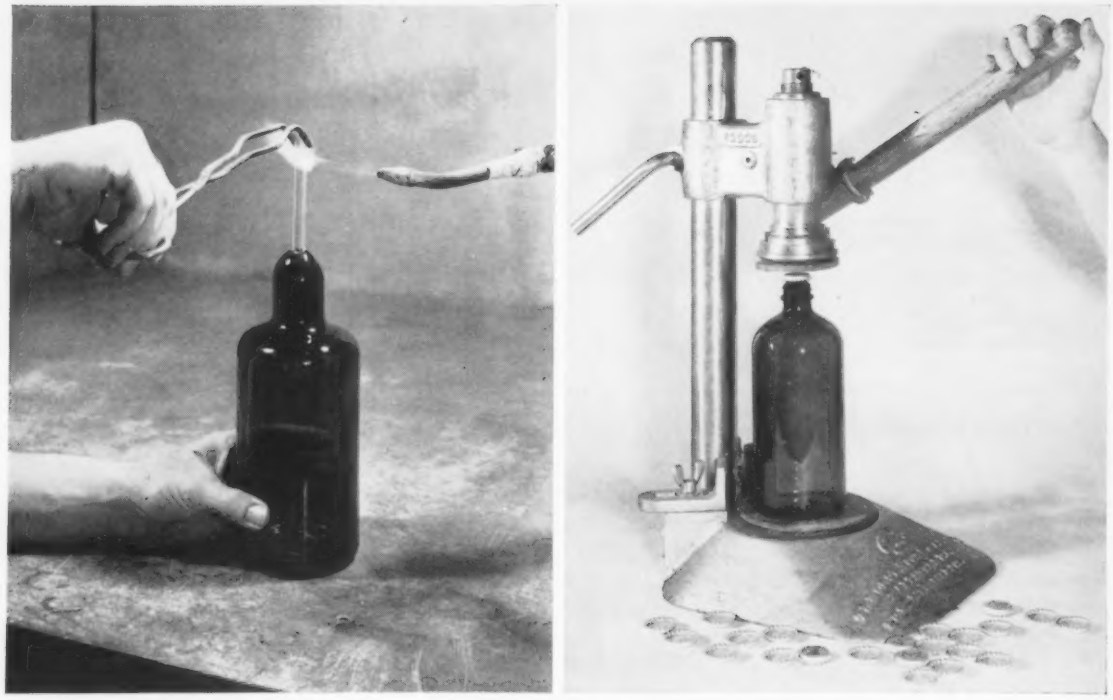

Fig. 3. Only method of sealing ampul is by flame (left) — a dangerous procedure for highly flammable chemicals, done only by reducing temperature of contents to —60°C. "Crown-and-cap" bottle (right) is sealed safely, quickly, and efficiently.

the crown-and-cap bottle are many. Making some comparisons between it and the ampul:

(1) A saving of more than 80 per cent was affected in the actual unit cost.

(2) The time spent in cleaning, filling, and sealing, particularly with a hazardous material, has been greatly reduced. With our vacuum filling methods, there is no difference in filling time between the crown-and-cap bottle and a regular bottle, although there is a very slight time increase in sealing—the time required to seal on the crown. (See Fig. 3.) However, there is a tremendous saving in time in sealing this package as compared to flame-sealing an ampul. **Our estimate of total time saved in these operations, by going to the crown-an-cap package, is approximately 80 per cent;**

(3) **The most important saving we find,** in comparing the ampul with the new package, **is the reduction of hazard on our packaging lines and in our stockroom operations.** (See Fig. 4.) It is impossible to place a percentage figure on the reduction of safety hazards. We do know that we have eliminated a most dangerous operation, that of flame-sealing over a flammable material, and our packaging line operators are completely at ease in handling the new package.

A study of the illustrations will show that the new bottles can be picked up more easily and are more stable, and the danger of breakage is almost completely eliminated. It was, unfortunately, a rather common occurence to knock the long stem off the top of the expensive ampul before packing it in its special shipping container.

Fig. 4. Expensive ampul presents problems and safety hazard in stockroom operations. It was not uncommon to knock stem off. Note simplicity and safety in stocking bottle with new double closure.

Reduce Shipping Costs

This leads us into shipping costs. Immediately upon sealing a filled ampul, we packed it in a corrugated box specially designed to

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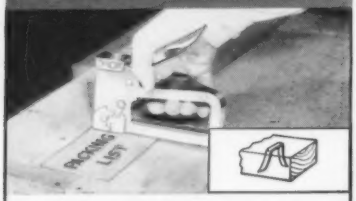

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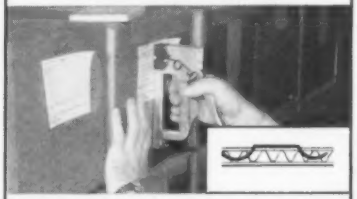

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Fig. 5. Single-faced corrugated sleeve, a simple form of packing, is all that is required to protect "crown-and-cap" bottle (left). In contrast, glass ampul, *containing same volume*, required costly, specially designed inner packing and box to protect stem; two labels were also required.

protect the stem. (See Fig. 5.) It was necessary to label the box as well as the ampul. This required two labels and doubled our labeling expense both in material and labor costs.

Because of the large size of this special box, an oversized outer

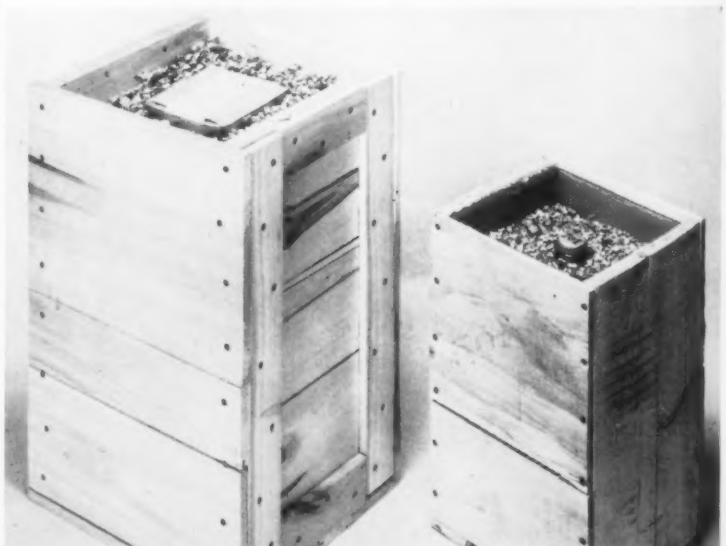

Fig. 6. Because of large box for ampul, oversized wooden shipper (left) was necessary. New package requires much smaller, less costly box, reducing storage space, shipping weight. Total estimated savings in shipping expenses: 50 per cent. Note contrast in shipper sizes for *same volume* of chemical packaged.

shipping container was used. (See Fig. 6.) Since the ICC requires that corrosive chemicals be placed in wood, this represented a large expense. **A substantial saving has resulted now that we can reduce the size of the outer wooden shipper. We estimate a total saving of 50 per cent in shipping expenses.**

Opens And Closes Easily

There are a number of advantages to the ultimate consumers. The new package is more convenient to handle and the hazards in opening the bottle have been reduced to a minimum. Undoubtedly, the chemists have approached an ampul with a face mask, a file, and some trepidation, hoping to make a clean break in the stem. If not, they would face the problem of covering their equipment and themselves with a dangerous material.

Resealing of the ampul is done only by flame, again a dangerous operation; **or, by plaster or tape** –methods which, at best, are crude as well as sources of contamination. With the latter types of closure, the chemist could not be certain that the contents were protected.

In the case of the spectroscopist, his highly accurate work demands that the reagents be pure and consistent. With the crown-and-cap package, he knows that the contents can be stored indefinitely in his laboratory, fully protected.

Resealing the crown-and-cap bottle is done simply by replacing the crown cap on the unit (a small, inexpensive, hand-operated closer is available for this purpose). In many instances, it is sufficient to use only the screw cap since the material is seldom exposed to much physical motion once it has been opened in the laboratory.

It is comparatively a simple matter for us to test and maintain purity of the chemicals, but it has always been expensive to deliver this purity to the customer. **With the crown-and-cap bottle, we have reduced the packaging costs substantially, still minimizing the chances of contamination.** (*End*)

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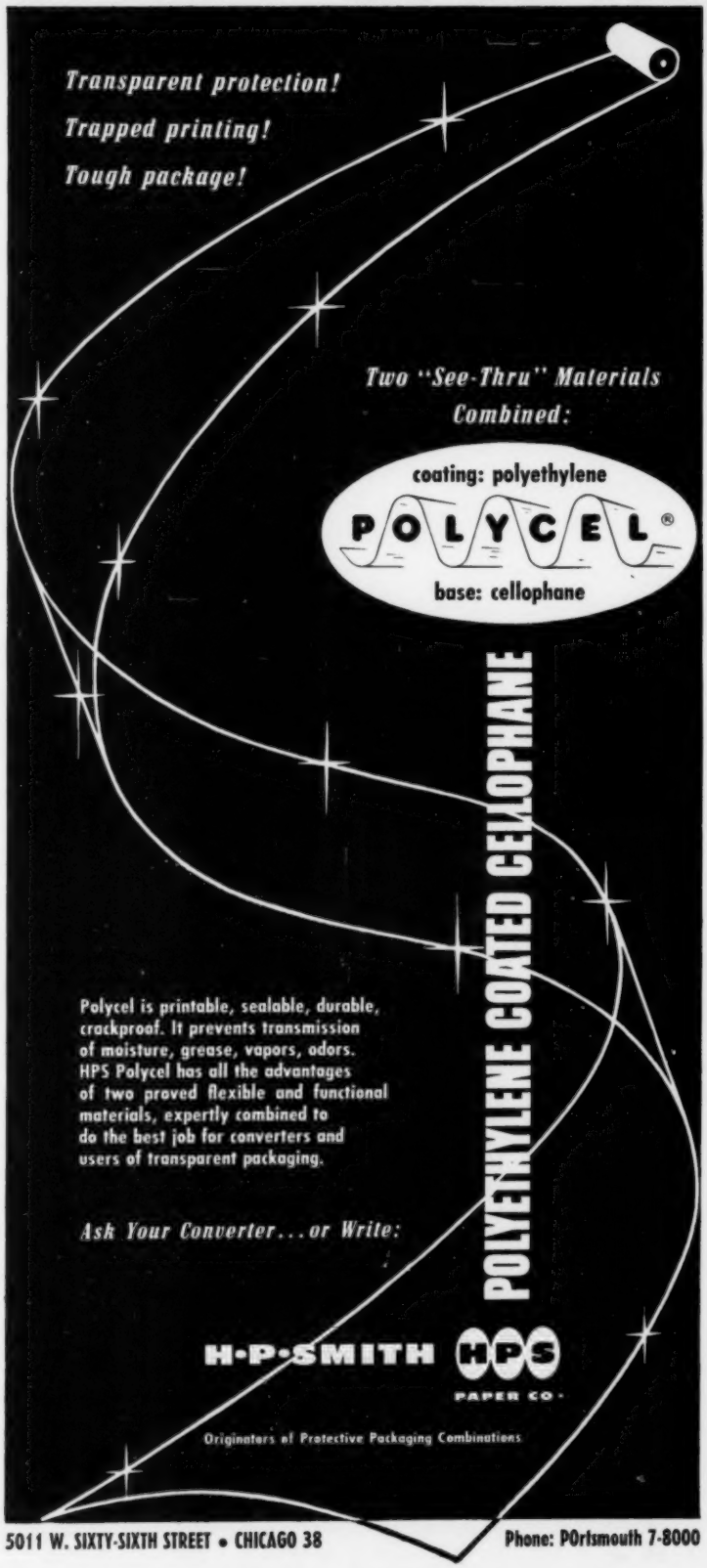
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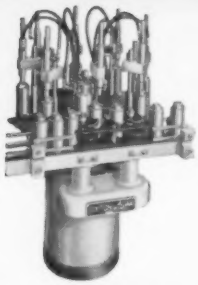

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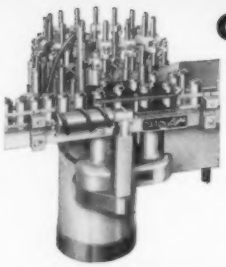

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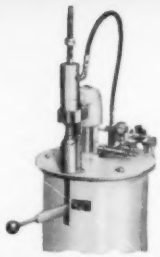

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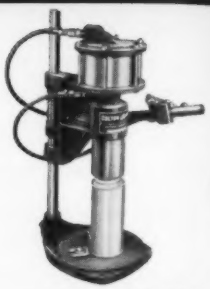

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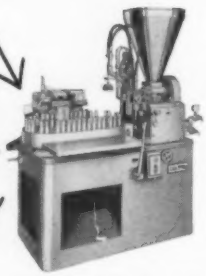

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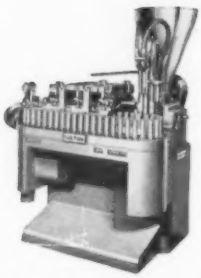

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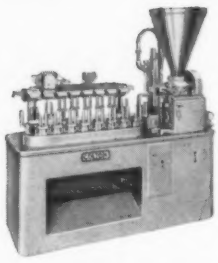

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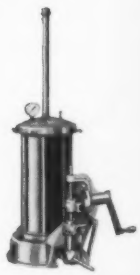

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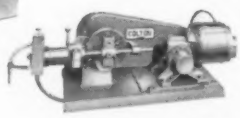

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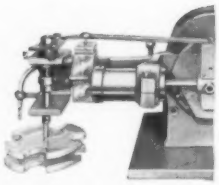

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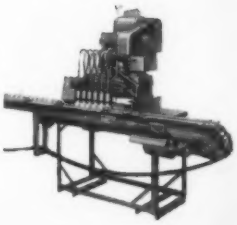

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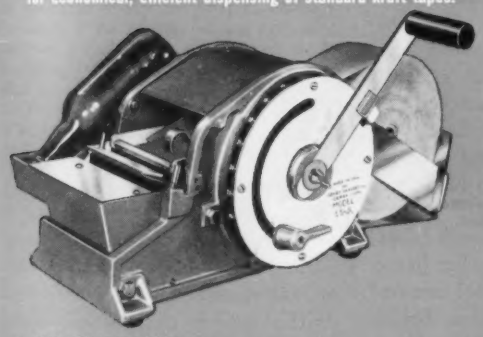

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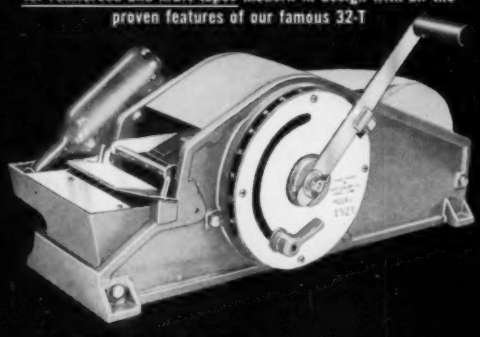

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Simple, systematic methods for . . .

Identifying the components of a packaging lamination

By Carl L. Brickman,
Manager, Product Testing Laboratory,
Standard Packaging Corporation,
Clifton, New Jersey

A laminated material is much like a sandwich. It may be from a simple bread-and-butter variety up to a veritable Dagmar. What is beneath the outer layer? What comprises the "meat" of the sandwich? Caliper alone can be deceiving. Taking it apart to see what's inside is the analysis part of this article. Just as tasting and smelling the edible sandwich can give information on the general ingredients—presence of butter, catsup, mustard, meat, etc.—so are the special tests performed in the analysis to identify components.

Making an analysis is a necessary operation for several reasons, among which the following may be cited:

1. Identity of a roll of stock may be lost in manufacturing.

2. A salesman is confronted with a competitor's price reputedly "for the same material," but $5.00/M. lower. In such a case, for example, analysis has disclosed that the competitive material did not contain a saran coating which the customer expected to get.

3. A customer cites a difference in performance, in a specification calling for 450 K-202 cellophane/0.002 in. polyethylene, between material submitted and a competitive shipment. Caliper was approximately the same, but analysis showed the competitive material to be 300 K-202/0.0029 in. polyethylene.

4. A salesman is requested to quote on a material: (a) as per sample, or (b) a material to give more protection than the sample. End-use may be given and information limited to the materials, but possibly not differentiating between type or caliper.

How many times have we wished to know the identity of a piece of unmarked, laminated packaging material? It is possible to take it apart and determine what the components are. Explaining simple, systematic methods which enable one to make the analyses, Mr. Brickman includes in this part, Part I, such tests as the diphenylamine spot test for nitrocellulose, the spot test for polyvinylidene chloride, the removal of ink, and others. In Part II, appearing next month, he gives a test for separating component films by toluene, and one for separating extruded polyethylene from primed films. Also included in Part II, are actual analyses of tiny samples of laminations, carried out by these methods. These analyses warrant careful study and will aid anyone in conducting tests on unknown materials.

Prerequisites For Success

In the present state of our knowledge, **four factors are of prime importance** to anyone who is attempting a qualitative or semi-quantitative analysis of a packaging laminate. These are:

1. **A complete knowledge of every flexible packaging material and film.** This includes papers and adhesives.

2. **A fairly complete knowledge of the art of lamination.** This is important because it is necessary to know what to look for, especially in complex structures in which, for example, there are three or four materials held together by adhesives or by heat seals. One must know from his familiarity with the properties of the several component laminates what methods of adherence are feasible and what are not; then look for

the probable method of sticking two adjacent components together.

3. **Good judgment** is indispensible, for, with the usual small sample of the "unknown," it is fatal to make any tests that may destroy it, or any of its components or adhesives.

The bane of all such analyses is the tiny sample of postage-stamp size or smaller. In a unit strip-package, the pocket, which is the only portion available for analysis, may be no larger than ¾ to 1 in. in diameter, but the working size only 0.42 to 0.62 sq. in. — a postage stamp has an area of 0.81 sq. in. Then there is the sample of tear tape, possibly ⅛x2 in. (0.25 sq. in.), the ultimate in small size!

4. **Good luck!** There is no gainsaying the statement that luck plays an important part in analyzing small samples. Sometimes the analyst may ponder for as much as a day on what to do next, because, if he guesses wrong and ruins his tiny sample, he is then unable to do anything further. While it may be true that guessing has no place in a scientific endeavor, it is also true that the current techniques and system of this form of analysis are only quasi-scientific.

With the foregoing explanations in mind, the following outline of tests and procedures, and some case histories are given in order to make an initial contribution to qualitative analysis of flexible laminated structures.

Recommended Apparatus

1. **Analytical balance.** Gram-atic (or equivalent). This type of balance permits making quick adjustment to zero, and obtaining weights within 15 sec.

2. **Desiccator.** A 6-in. desiccator set up to give 51.8 to 49.0 per cent relative humidity (R.H.) at 73 to 80°F. which is obtained from a saturated solution of calcium nitrate in its base, making sure that an excess of salt crystals is always present in the solution. The desiccator should be placed conveniently to the analytical balance for quick transfer and weighing of conditioned samples, particularly cellophane and paper. If a slower acting type of balance is used, the samples should be weighed in weighing bottles.

3. **Templates for accurate cutting of samples.** These are preferably made of stainless or tool steel. Thickness may be between ⅛ and 3/16 in.; width x length as follows: ¼x4 in., ½x4 in., ¾x4 in., and 2x4 in. Various sized samples can be cut from combinations of the different templates. A single-edge razor blade is used for cutting.

4. **Infrared lamp, 375 w.** This is used for flash-drying of samples upon removal from solvent wash.

5. **Evaporating dishes.** Porcelain, shallow form with flat bottom, 195 and 215-ml. capacities, and watch glasses to cover. These are used for holding sample in solvent for separation.

6. **Stop watch.**

7. **Oven.** This should be of the electric type usually found in the laboratory. It should be controlled at 212°F.

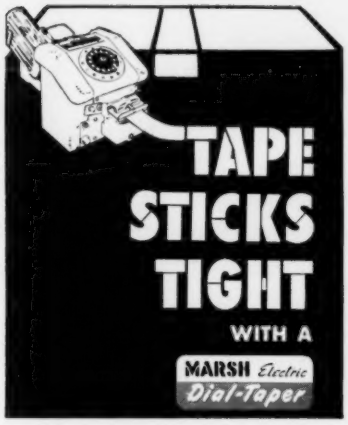
8. **Miscellaneous.** A hotplate and squares of asbestos; 35-ml., high-form porcelain crucibles (for holding small amount of solvent used in spot tests, ink removal, rinsing medicine dropper, etc.); absorbent cotton (for ink removal); stirring rods; stopcock grease; sheets or a small roll of 0.001- to 0.0015-in. aluminum foil; 10- and 100-ml. graduated cylinders; 30-ml. dropping bottles; 150- and 250-ml. beakers; 8x8-in. double-strength glass plate; small tweezers; swab stick for removing adhesive and coating from sample which is in solvent. The latter may be made by taking a 6-in. dowel pin, 5/16-in. diam., and applying several thicknesses of cheese cloth or cotton scrim at one end to form a small, soft pad. This should be overwrapped and firmly tied with twine or nylon thread to prevent its slipping off the pin when wet with solvent.

Beginning The Analysis

Before beginning any of the tests outlined herein, especially if your only sample is extremely small like the tear-tape illustration, it should be examined visually for physical appearance. Is it:

Transparent, translucent, or opaque?
Glossy or dull?
Like foil and/or paper?
Colored?
Printed?

All of these things and others may give you a clue as to partial iden-



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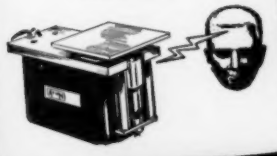

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HURRY—*Get your official entry blank and details from your "SCOTCH" BRAND Tape Distributor or 3M Representative. Use coupon below to request his call, or contact him direct.*

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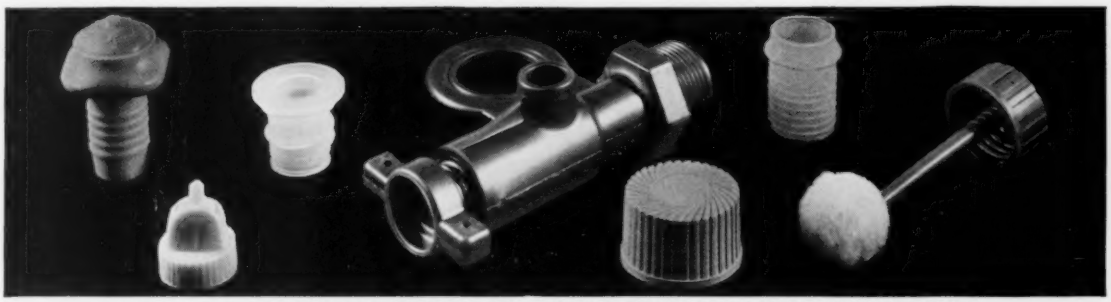
in packaging

CONTROL OF FABRICATION SHRINKAGE . . . KEY TO SUCCESSFUL POLYETHYLENE FITMENTS AND CLOSURES



CLOSURES, FITMENTS AND LIDS OF ALL KINDS CAN BE MADE OF DOW POLYETHYLENE TO COMPLEMENT PRACTICALLY ANY CONTAINER.

DOW POLYETHYLENE GIVES THE PACKAGE ENGINEER ONE OF THE MOST VERSATILE MATERIALS AVAILABLE FOR HIGHLY FUNCTIONAL FITMENTS AND LIDS.

Polyethylene's long flex-life and high impact resistance over a wide range of temperatures assure maximum product protection through handling and shipping . . . and provide continued tight seals after repeated removal and reclosure in the hands of the consumer.

Moreover, polyethylene is an excellent water vapor barrier and has a low water absorption rate even at direct contact. This assures important dimensional accuracy and stability during long term aging.

Polyethylene is characterized by quite a pronounced shrinkage during fabrication when compared to other thermoplastic materials. While the high flexibility of polyethylene will counteract some variation in dimension, it cannot be counted on to answer all shrinkage problems. Fabrication shrinkage must be taken into account during part design and mold design and construction. Shrinkage is affected by part design, mold temperature and injection pressure. Data on the effects of injection pressure (Figure 1) and mold temperature (Figure 2) during molding fabrication were obtained through studies conducted in the laboratories of Dow Plastics Technical Service.

For your copy of the Plastics Technical Bulletin which discusses this subject in detail and for answers to any questions concerning Dow plastics for packaging write to Dow Plastics Packaging Service 2171 DH4, Midland, Michigan.

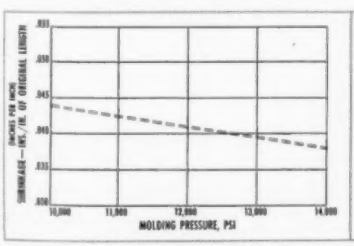


Fig. 1. Effect of Mold Pressure

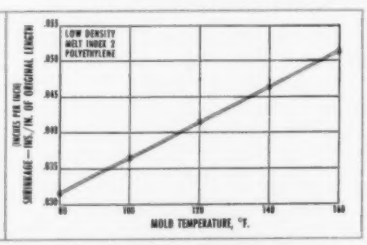


Fig. 2. Effect of Mold Temperature

THE DOW FAMILY OF POLYETHYLENES

410 M	Low Density—High Stress Crack Resistant
610 M	Low Density
710 M	Low Density
910 M	Low Density
700 M	Low Density
900 M	Low Density
901 M	Low Density
550 E	Intermediate Density
770 M	Intermediate Density
771 M	Intermediate Density
590 M	Intermediate Density
991 M	Intermediate Density
1000 M	Intermediate Density
1001 M	Intermediate Density

NOTE: The formulations ending in 1 denote those formulations which contain a slip additive.

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Styron®
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TABLE I

Basis Weights Of Materials

Material Identification	Thickness (in.)	B.W. (24x36—500)*
ALUMINUM FOIL	0.0003	12.67
	0.00035	14.80
	0.0004	16.87
	0.0005	21.08
	0.0007	29.60
	0.001	42.15
	0.00125	52.68
	0.0015	63.5
	0.002	84.7
CELLOPHANE:		
300 gauge — PD	0.0009	20.09
MSD-60, K-201	0.0009	20.57
K-202, OX-511, LSAD, MSAD-80, MSAD-86	0.001	22.15
K-203	0.0011	24.00
450 gauge — PD	0.0013	28.80
MSD, MSAD, LSAD, K-202, K-203	0.0014	30.86
CELLULOSE ACETATE:		
88 gauge	0.00088	17.28
100	0.001	19.64
120	0.0012	23.61
150	0.0015	29.59
200	0.002	39.27
FLUOROCARBON: "Trithene," "Kel-F," "Genetron," "Teflon FEP"	0.0005	16.60
	0.001	33.23
	0.002	66.46
	0.003	99.70
NYLON 6/6	0.001	18.30
	0.0015	27.45
	0.002	36.61
PLIOFILM:		
Type N1 — 40 gauge	0.0004	7.85
BF — 75	0.00075	13.09
N2 — 80	0.0008	14.00
100	0.001	18.00
120	0.0012	20.57
140	0.0014	25.40
MW — 140	0.0014	23.83
170	0.0017	29.00
235	0.00235	40.00
POLYESTER:		
"Mylar" — 25 gauge	0.00025	5.38
50	0.0005	10.76
100	0.001	21.53
200	0.002	43.06
"Videne A"	0.0002	4.30
	0.0004	8.59
	0.0005	10.73
	0.001	21.48
	0.002	42.95
POLYETHYLENE:		
0.92 d.	0.0005	7.20
	0.00075	10.80
	0.001	14.40
	0.0015	21.60
	0.002	28.80
	0.0025	36.00
	0.003	43.20
0.95 d.	0.0005	7.41
	0.001	14.83
	0.0015	22.24
	0.002	29.65
POLYPROPYLENE	0.001	12.70
POLYSTYRENE	0.001	17.00
	0.00125	21.28
	0.0015	25.56
	0.002	34.01
POLYVINYL ALCOHOL	0.001	20.13
	0.002	40.26
SARAN (polyvinylidene chloride):		
50 gauge	0.0005	13.25
75	0.00075	19.87
100	0.001	26.50
150	0.0015	39.72
200	0.002	53.00
VINYL:		
Polyvinyl chloride and copolymers—		
1.29 d.	0.002	40.28
1.21 d.	0.002	37.80
1.36 d.	0.002	42.47
"Vitafilm"—		
1.29 d.	0.001	20.09

*Note that the basis-weight values shown are for a ream size 24x36—500, and do not apply if any other ream size is used. It is absolutely necessary that weights of all components of a lamination be on the same ream basis.

tity. Also, note the end-use.

Weight In Terms Of Basis Weight

In most cases, it is necessary that the sample be weighed before conducting some of the qualitative tests. **The weight of a material obtained in an analysis can be an aid in limiting identification, and in determining if a specified caliper is within the manufacturer's tolerance limits.** Weighings are made in grams and converted to the unit used in the industry which is basis weight (B.W.) in pounds contained in a ream of 500 sheets 24x36 in., or written: B.W. (24x36-500).* This ream size contains 3,000 sq. ft., or 432,000 sq.in.

From the total weight in lb/ream, the yield as sq. in/lb. is calculated. Any material in the lamination which is specified by caliper is calculated to B.W. from the manufacturer's given yield, or from the density of the material. In reporting on a lamination, the components are listed from *outside to inside*.

*There are a number of different ream bases used in the paper industry depending on the paper classification (lithograph, bonds, book stock, etc.). The one shown here is in general use, however, especially by the suppliers of laminated packaging materials. In the past year, the foil industry has been changing to this size ream to conform with industry practice and standardize with those in the converting field. It is absolutely necessary that weights of all components of a lamination be on the same basis.

Calculations:

$$\text{B.W.} = \frac{\text{Wt. in gm.} \times 952.40\dagger}{\text{Area in sq. in.}}$$

$$\text{Yield} = \frac{432{,}000}{\text{B.W.}}$$

$$\text{B.W.} = \frac{432{,}000}{\text{Yield in sq. in/lb.}}$$

Basis weights of various materials used in flexible packaging are listed in Table I. The B.W. of any caliper not indicated can readily be calculated since B.W. is *directly* proportional to gauge; yield is *inversely* proportional to gauge.

†This constant applies only when a ream size of 24x36-500 is used.

Test I: Preliminary Examination

In addition to spot tests applicable to type of coating, often much information as to procedures to follow can be obtained about laminated structures by several simple tests. One consists of taking a small piece ¼ to ½ in. wide by 1 to 2 in. long and stretching it by hand. This may so loosen or fracture the piece that it will be possible to determine by inspection, for example, if the substrate is film laminated or extrusion-coated. Other examinations are to test for sealing temperature and whether any softening or oozing of the laminant occurs which would indicate wax; test effect of solvents on the film.

Test II: Diphenylamine Spot Test For Nitrocellulose

Reagent. The reagent which is suitable for general applicability in qualitative tests over a wide nitrate range is prepared using the following formula:

Water, distd.	7.5 ml.
Diphenylamine	0.025 gm.
Sulfuric acid, conc.	25.0 ml.

Add the concentrated acid *slowly* to the diphenylamine and water in a 150-ml. beaker. The heat of mixing will effect solution of the diphenylamine. Cool to room temperature and transfer to a 30-ml. dropping bottle. Apply a light coat of stopcock grease to the stopper and neck of the bottle.

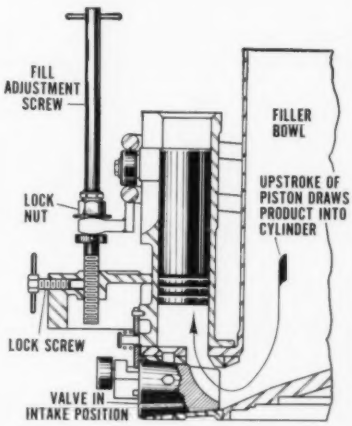
This reagent has long been known as a sensitive test for nitrates by the production of a blue color. It has been found to "keep" up to six months, but should be discarded when it no longer produces an adequate color with a standard nitrate sample. Such a standard might be a film which is known to be coated with nitrocellulose.

Procedure and discussion. A single drop of the indicator reagent is placed on the film sample. A stop watch is used to note the time for the color to develop.

On cellophanes such as types MSD and MSAD, the dark blue

HOW TO MAKE A FILLER PAY ITS OWN WAY

Take a walk with us around a Pfaudler rotary piston filler and you'll see why many of our customers make the machine pay for itself in a year or two of operation.



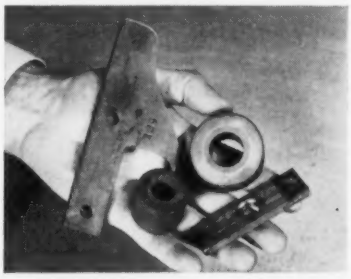
FAST FILL—NO SPILL. Look first at this piston design. It has just the right combination of smooth fit and small "cushion" to let you fill even very light products right through the range to heavy, viscous fluids. There's no surging. No splashing. No piston leakage. Accuracy is guaranteed on all sizes to ± 1/10 fluid oz.

You can accurately adjust the amount of fill without dismantling or even stopping the filler.

While you're looking, notice that none of the parts are within or over the bowl . . . this eliminates any possible contamination from lubricants.

HALF-HOUR CLEAN-UP. One man can clean a Pfaudler filler in *one-half* hour. He needs no tools or hoists. He removes only two parts . . . piston and valve . . . to make ready for complete cleaning. He makes no adjustments after cleaning. No gaskets to clean and refit.

Even on our largest filler there are only twelve grease fittings—all located in one convenient header. All gears are submerged in oil, so they require little maintenance.



LOW-COST REPAIRS. There are only four primary wearing parts on these fillers—piston and valve rollers, valve trip cams and valve-lock wear pads. All are small, inexpensive, easy to stock and replace.

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- Wrinkle-Resistance—wraps smooth without pull lines
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- Printable Surface—clear, sharp; single, multicolor, or reverse

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Containers
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...doubles packaging production with
end loading CECO® cartoners

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The list of bakeries using the CECO Model 40 Cartoner is long, including Wagner, Drake, Fischer, Dugan, Blue Bird, Bradley Pie, Table Talk, Horn & Hardart, and many others. Find out how you can slash production costs. Write for brochure today.

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MEMBER, PACKAGING MACHINERY MANUFACTURERS INSTITUTE

78-88 LOCUST AVENUE, BLOOMFIELD 3, N. J.

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will usually form in from 7 to 15 sec. If no color develops after 1 to 2 min., the test is considered as "negative." If, after about 1 min., a slight-to-definite blue should develop, then a saran coating over cellophane is suspected. Check with the pyridine test. (See Test IIIa.)

Note: Roberts *(2)* reported that the time for a particular color to develop, after a single drop of the indicator solution was placed on the test film, was found to depend in a consistent manner upon the nitrate content of the film. Color developed faster with increasing nitrate content up to about 2 per cent nitrogen. There was no apparent color development time with nitrate content in the 2 to 6 per cent nitrogen range. Above approximately 6 per cent nitrogen, color developed more slowly with increasing nitrate content.

Test IIIa: Pyridine Spot Test For Polyvinylidene Chloride (Saran)

A test according to Player *(1)*, makes use of the dark-brown-to-black color formed by treating the film with a drop of pyridine, then adding to it a drop of saturated methanolic alkali. The test is applicable to saran coatings or unsupported film.

Reagents. These are prepared and labeled as indicated below:

Solution A:	Pyridine	
Solution B:	Water, distd.	25 ml.
	Potassium hydroxide	27.5 gm.
	Methanol	2.5 ml.

Solution A is a standard reagent purchased as such. It may be held in a 30-ml. dropping bottle with a rubber bulb.

To prepare Solution B, mix the water and potassium hydroxide, by stirring, in a 250-ml. beaker. Heat will be produced. When cooled to room temperature, add the methanol and mix. It is not recommended that Solution B be stored in the dropping type bottle. A better container, we have found, is the small (2½x3¼ in.) "Pream" jar (or any small jar with a screw cap with rubber gasket). A medicine dropper is used for the drop application. When not in use, the dropper can be held to the side of the jar by a rubber band. After each use, the medicine dropper should be rinsed in methanol to prevent alkali from plugging the tip.

Procedure and discussion. A drop of pyridine (Solution A) is placed on the film sample. To this drop is added a drop of Solution B, and the time is noted. The color will usually form within the alkali drop and may vary from showing as dots, or small specks, to the complete drop's being colored. Time required may range from 5 to 30 sec., seldom longer than 1 min. for a "positive" rating. If no color develops after 2 min., it is rated as "negative."

On Saran Wrap 5 (formerly saran S-517), for example, we have found the color a lighter shade of brown with the formation rated as *slight* in 5 sec. and *definite* in 1 to 2 min. On such vinyl chloride films which we have tested, our rating showed "negative" up to 7 min. at which time the film dissolved.

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America's leading Manufacturer & Distributor of Physical Testing Machines
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This test is considered more positive and easier to perform on coatings than the so-called copper wire test, in which a copper wire is heated to redness and touched to the sample. If, on re-heating the wire, a brilliant green color is imparted to the Bunsen flame, a compound containing chlorine is present.

Adhesion of saran coating on a polyester or cellophane film may sometimes be found to be weak, in which case it transfers to the adjacent side, for example, of an extrusion-coated polyethylene when effecting separation. Therefore, it is advisable to test for the presence of saran both on the inside of the film and on the adjacent side of the separated polyethylene film. If found "negative" on the inside and "positive" on the polyethylene, the coating on the latter is then removed by swabbing with methylethylketone/acetone (MEK/acetone) for determination of amount of coating applied.

Test IIIb: Saran-Coated Cellophanes (K-202, K-203)

Procedure and discussion. K-203 cellophane has a wettable surface. If the test area is small, apply a drop of water on the surface. If it spreads, "203" is indicated; if it remains as a bead, "202" is indicated. If a larger sample is available, blow breath on the film. The "202" will fog, but "203" will remain clear.

Test IV: Densities Of Polymers

A rough determination of specific gravity (sp. gr.) is often very useful in limiting identification when other tests may not be so conclusive. This may be determined quickly by the flotation method.

Solutions. These are made up, representative of the specific gravity of each film material. Alcohol-water systems can be used for specific gravities under 1.0, and glycerol-water, or inorganic salt-water, for those over 1.0. Chemical handbooks give tables of percentages for corresponding gravities.

Examples of systems which can

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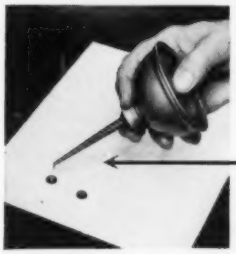

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NO GREASE "CRAWL"

THE TEST: Drops of oil placed on this Patapar remain on the surface indefinitely. The oil will not spread or "crawl." No seep through.

As a packaging material, or wherever a grease-proof barrier is required, new types of Patapar Vegetable Parchment provide positive resistance. With these grease-proof Patapars there is no penetration. Oil will not spread on Patapar's surface. There is no grease crawl—no "wetting".

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Patapar gives you WET-STRENGTH, too

High wet-strength is a basic quality of the many different types of Patapar. And, made from pure cellulose, Patapar is odorless, non-toxic. *It is furnished plain or colorfully printed.*

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1½ oz. containers through 1 gallon. Spot, face, or wrap-around label applications. Fits 30" x 15" floor space. Holds one gallon of glue.

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TABLE II
Film Properties

Film	Sp. Gr.	Flammability/ Odor	Solubility at room temperature		
			Ethanol	Acetone	Toluene
CELLOPHANE:					
Plain	1.45	Burning rate & odor like paper	I	I	I
Lacquered	1.48	Ditto	C:PS	C:S	I
Polymer-coated	1.44	Ditto	C:I	C:S	I
CELLULOSE ACETATE	1.25-1.35	Slow burning, melts & drips; noticeable acetic characteristic	PS	S	I
FLUOROCARBON: "Trithene," "Kel-F," "Genetron," "Teflon FEP"	2.1-2.15	Non-burning, slight charring; mild, waxy-type odor	I	I	I (IH)
NYLON 6/6	1.09-1.14	Self-extinguishing, melts; characteristic of burning proteins	I	I	I (IH)
PLIOFILM	1.14	Self-extinguishing; very pungent, acidic characteristic	I	I	I[a]
POLYESTER: "Mylar"	1.39	Very slow; mildly sweet	I	I	I
"Videne A"	1.34	Very slow, melts and drips; mildly sweet	I	Sl.[f]	I[b,e]
POLYETHYLENE: Regular	0.92	Slow, melts and drips; mildly wax or paraffinic	I	I	I (SH)
Medium high density	0.933-0.96	Ditto	I	I	I (SH)
POLYPROPYLENE	0.81-0.92	Ditto	I	I	I (SH)
POLYSTYRENE	1.05	Moderate, softens; artificial gas-like odor	I	S	S
POLYVINYL ALCOHOL	1.2-1.31	Moderate; mildly sweet, non-acrid	I	I	I (IH)
SARAN (polyvinylidene chloride	1.68	Self-extinguishing, softens; pungent, chlorine characteristic	I	PS[c]	I (IH[d])
VINYL (polyvinyl chloride and copolymer)	1.21-1.36	Slow or difficult, softens; pungent, chlorine characteristic	I	S	I

Legend & notes:
C —coating
H —hot
I —insoluble
S —soluble
PS—partly soluble
Sl.—slight

a—puckers and curls without softening ½ to 5 min.; dries as flat film
b—stretched film in thin gauge shrinks and "balls."
c—shows "orange peel" 5 to 10 min.
d—considerable shrinkage 2 min.
e—hot toluene separates heat-laminated materials
f—slight-to-definite tackiness 3 to 5 min.

be used in this test are as follows:

System	Sp. gr.
Alcohol-water	0.81 — 0.96
Sodium chloride-water	1.01 — 1.20
Sodium nitrate-water	1.21 — 1.36
Potassium tartrate-water	1.30 — 1.40
Zinc chloride-water	1.41 — 2.1

Solutions are carefully adjusted to the desired specific gravities at 75°F. (or at the average laboratory temperature) by a hydrometer. For greater accuracy, these are used in narrow ranges.

A convenient container for a solution is the 4-oz. clear glass, wide-

mouth bottle with glass stopper. The neck and stopper should be lightly lubricated with stopcock grease. Finally, a few drops of a wetting agent, such as 10 per cent Aerosol OT solution, are added to minimize any tendency of the sample to float due to the surface tension of the reference liquid.

The specific gravities of films are given in Table II; the solubility of coatings in Table III.

Procedure and discussion. The sample need not be larger than ½x½ in., which can be held easily by a long-handled pair of tweezers for dipping it into the solution, releasing, and recovering it. The sample should be free of air bubbles both on the surface and in the material.

The sample is placed into, and below the surface of, the solution. The specimen's remaining suspended at a constant level indicates that its specific gravity is the same as that of the solution. Density variations due to swelling are avoided by repeated trials of fresh samples in the solution until a balance is observed; that is, it remains suspended at a constant level.

Test V: Solubilizer For Casein-Latex Type Of Adhesive

This test is satisfactory for separating aluminum foil/paper frequently found bonded with a casein-latex type of adhesive.

Reagent. This is prepared as follows:

Water, distd.	150 ml.
Trypsin	0.25 gm.
Urea	0.25 gm.
0.5 *N* aqueous sodium hydroxide	1.0 to 1.2 ml. *max.*

In a 250-ml. beaker, add the reagents in the order shown. Warm the mixture on a hotplate at low temperature until the solids have dissolved. This reagent should not be stored for future use, but made up fresh shortly before it is to be used.

Procedure and discussion. The sample, if 2x4 in., is folded in half, paper side out, and placed into a 195-ml. evaporating dish. Add sufficient solution to keep the specimen immersed. If there is any tendency for bad curling, paper clips can be used to hold the ends together. The dish is covered with a watch glass and kept warm throughout the period of effecting separation, which may require anywhere from 6 to 18 hr.

The sample is examined from time to time for signs of separation, or whether it can be started along the edges. A great deal will depend upon the type of paper as to the amount of care and diligence required in handling and removing the wet paper. Least amount of trouble is given by glassine, wet-strength paper, and pouch stock. Sulfite and tissue are usually more difficult.

If the paper splits, tears, or is removable only in pieces, and still leaves adhering fiber on the aluminum foil, the pieces are carefully collected on a small tared watch glass or small sheet of foil.

The remaining wet foil/paper is

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FOR BOTH LIQUIDS AND POWDERS

Completely Automatic production of up to 300 packets per minute. Interchangeable for ALL POWDER OPERATION — ALL LIQUID OPERATION — SIMULTANEOUS LIQUID AND POWDER OPERATION.

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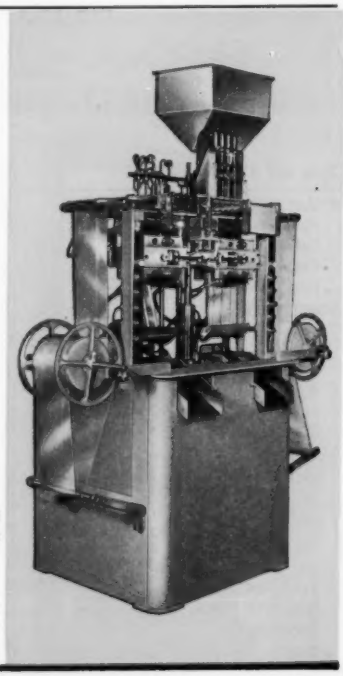

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C. L. Brickman is a graduate of Defiance College, and of Case Institute of Technology with a B.S. degree in chemical engineering. Since 1953, he has been associated with Standard Packaging. Prior to this time, he was with Benj. C. Betner Company, Thomas M. Royal & Company, and Goodyear Tire & Rubber Company. He is a member of American Chemical Society, Rubber Division A.C.S., and TAPPI.

then transferred to a glass plate, paper side up. Held near the bottom edge with a finger of one hand, it is rubbed with a finger of the other hand in one direction until all fibers are removed. These are added to the watch glass along with any loose fibers that may be in the solution. The materials collected on the watch glass are dried in an oven for 1 hr. at 212°F., transferred to a 50-per cent R.H. desiccator, and weighed after 1 to 2 hr.

Paper that is removed in one piece is placed on a paper towel, dried, and conditioned at 50 per cent R.H. before weighing. Wet-strength paper is distinguished by its resistance to balling and disintegration in a wet-rub test. It remains firm for 10 to 20 consecutive rubs under firm pressure of the finger.

Test VI: Ink Removal

Solvents. The solvents most generally required for this test are:

Alcohol
Alcohol/MEK
Toluene/MEK
Alcohol/toluene

Procedure and discussion. On a laminated structure with surface-printed **aluminum foil,** ink is removed *before* separation is made. The solvent for flexographic ink is alcohol or alcohol/MEK; for rotogravure ink, toluene/MEK. A small crucible is an ample container and is readily cleaned.

The sample is placed on a paper pad and held to the paper by spreading the fingers of one hand. With the other hand, a small tuft of cotton is touched to the solvent and squeezed until it no longer drips solvent. Rub the center of the sample with the cotton tuft, gradually working toward the edges. This is repeated several times until the center is free of ink. The ink along the edges is removed by repeated quick wipings in an outward direction. The sample is transferred to a clean sheet of paper on the pad as required during the several wipings. An excess of solvent on the cotton is to be prevented to avoid creeping to the opposite surface of the sample.

Ink on surface-printed **paper** can be similarly removed if it has a hard finish such as glassine. In the case of other papers, however, it is either not removed or removed only after the paper has been entirely separated, when it can be immersed and swabbed in solvent.

Cellulose acetate is usually reverse-printed in a lamination and the ink is removed after separation in the same general manner as above. However, only alcohol or alcohol/toluene can be used.

Ink on surface- or reverse-printed **cellophane** requires more care. To avoid removal of nitrocellulose or saran coating along with the ink, only alcohol/toluene can be used. The complications with ink on transparent materials can be avoided by selecting the sample from an unprinted area if at all possible.

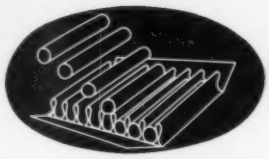
All samples, following ink removal, are flash-dried and conditioned in the desiccator before weighing.

(Part II, concluding this article, will appear next month. It contains a test for separation by toluene, and one for separation of extruded polyethylene from films with primers. Results of actual analyses, based on the tests, are shown.)

TABLE III
Solubility Of Coatings

Type and Kind	In Representative Solvent at Room Temperature				
	Acetone	Ethanol	Ethyl acetate	Toluene	Petroleum naphtha
CELLULOSIC:					
Nitrocellulose	S	PS-S	S	I	I
Cellulose acetate	S	I	PS	I	I
Cellulose acetate butyrate	S	I	S	I	I
Ethyl cellulose	S	S	S	S	I
VINYL POLYMERS:					
Polyvinyl acetate	S	S	S	S	I
Polyvinyl chloride	PS	I	I	I	I
Polyvinyl chloride-acetate	S	I	S	I	I
Polyvinyl butyral	I	S	PS	S	I
Polymethyl methacrylate	S	I	S	S	I
Vinylidene chloride	S	I	I	I	I
PROTEIN:					
Zein	I	S	I	I	I
RUBBER COMPOUNDS:					
Cyclicized rubber	I	I	I	S	S
Chlorinated rubber	PS	I	S	S	I
SYNTHETIC RUBBER:					
Butyl (GR-I)	I	I	I	PS	PS
Neoprene (GR-M)	I	I	I	S	I
Isobutylene	I	I	I	S	S
WAXES:					
Paraffin	I	I	I	S	S
Microcrystalline	I	I	I	S	S

Legend: I —insoluble
S —soluble
PS—partly soluble



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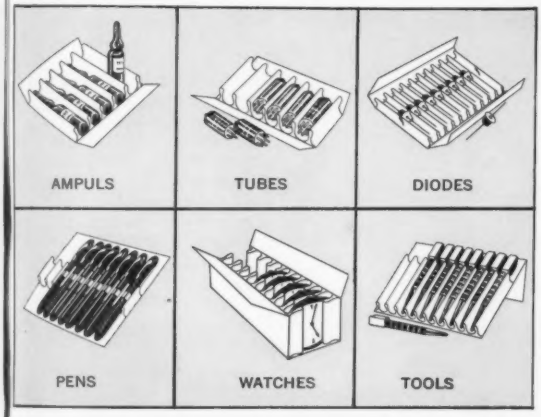

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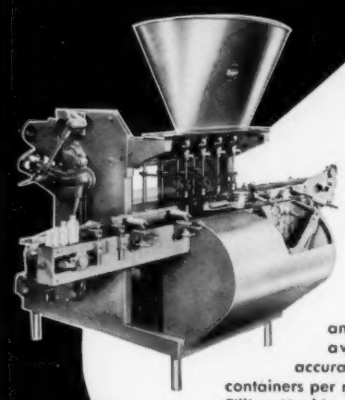

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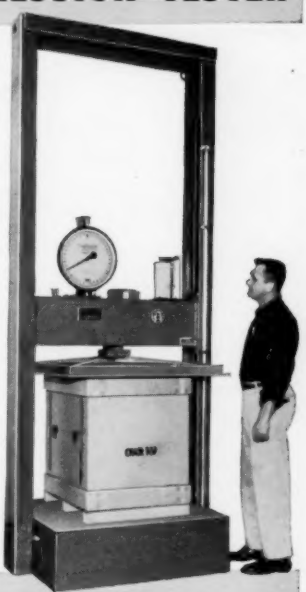

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Whether you're ribbon-coating or spotting glue, putting it in corners, grooves or holes . . . there's an FF Glue Gun to help you do the work better, easier, faster and at far less cost. These amazing semi-automatic tools eliminate glue waste, minimize application time, make any gluing job a clean, precise operation. Widely recommended. Guaranteed. Send for catalog.

JOHN P. FOX COMPANY, INC.
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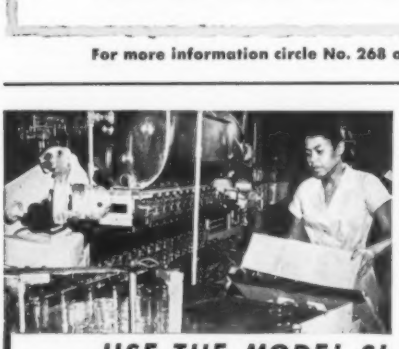

A complete Filler Machine Co. line at Brook-Maid Co., Inc., Brooklyn including unscrambler, cleaner and straight line filler filling jams, jellies and preserves.

USE THE MODEL SL-55

To Fill Semi-Liquids, Semi-Solids

You'll get *more accurate filling, quicker cleaning, faster change over* when you use a Filler Model SL-55 piston type automatic filler!

- they handle from 2 oz. to quart and 2 lb. containers, fill food, dairy, paint and chemical products.
- positive accurate filling is assured every time because valves are air-free and pallets are air operated
- a "no container, no fill" feature saves the product from being wasted and keeps the machine clean
- you get faster, easier cleaning since the valve mechanism can be dismantled quickly
- all contact parts and parts around the filling zone are 18-8 stainless steel
- speed of fill is from 60 to 300 containers per minute, depending upon size of machine.

Get further details today on this model or our other models of filling machines and let us bid on your job.

The **FILLER MACHINE CO., INC.**
the original builder of Philadelphia piston fillers
12 Penn Avenue, Rockledge, Philadelphia 11, Penna.

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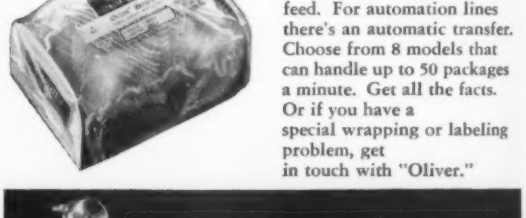
large packages and small...the "Oliver" wraps and labels them all to sell and to save!

Makers of prepackaged items find the quick adjustability and the wide range of the versatile "Oliver" Wrapper save hours daily! Using modern wrapping materials, it heat-seals packages for utmost protection. On short runs or long, the one-man "Oliver" is unmatched in efficiency. Here are a few of its many operational features: A photo electric cell registers printed wrappers accurately. Switch from endfold to underfold at the flick of a finger. Adjust wrapper cut-off length while machine is running. Rolls of beautiful heat-seal labels (printed by "Oliver") can be changed in a jiffy. Cardboard folder-feeder has mechanical or vacuum feed. For automation lines there's an automatic transfer. Choose from 8 models that can handle up to 50 packages a minute. Get all the facts. Or if you have a special wrapping or labeling problem, get in touch with "Oliver."



Oliver PACKAGING DIVISION
MACHINERY COMPANY
445 6th, N. W., Grand Rapids 4, Michigan

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What's important in choosing a box or crate, balancing the costs of alternative packages, comparing test shipments, making product design changes to fit packaging needs: Mr. Stuart stresses the importance of these guideposts.

Practical steps to an effective package

By Charles F. Stuart,
Package Engineer,
Lyon Metal Products, Incorporated,
Aurora, Illinois

Packaging costs are second only to those of steel in the production of many steel equipment items manufactured. It is not hard to understand that much thought and planning go into the packaging phase of getting a new product on the market.

In developing a new product, structural and functional package design is as much a part of the procedure as the formation of the steel. In many companies, too often a product is completely developed prior to planning its package. Then the unfortunate package engineer must work around many obstacles, resulting in higher costs. At Lyon, we develop the package right along with the design of the product itself, beginning with the blueprint stage. Many times a slight change in a dimension makes it possible to nest or otherwise consolidate the parts of an item in order to package it most effectively.

Basic Packaging Steps

We have a procedure or method of approach which we follow in working out the packaging of new items. To see how we do this, first let's review our basic procedure. Then, let's apply it to the packaging of a particular item we make. A good example is our foreman's standing shop desk, a very bulky item. (See Fig. 1)

After our special products inquiry committee determines that the product is adaptable to our manufacturing facilities, our engineering department prepares detail drawings of all components, as well as an assembly drawing of the completed product. (See Fig. 2) From engineering, the blueprints go to the estimating department for an estimate on the unit packaged, set up or knocked down. In some cases, the units are estimated both ways. Since one of the estimating factors is the cost of packaging, it is at this point that the package engineer starts developing the package.

Several questions need answering before we can reach any decision on packaging. Should we use a nailed wood crate or a corrugated box? What type of crate or box should we use? Does our package need interior packing? If so, what kind and how much?

Points Of Good Package

At this point we pay special attention to five key points. We feel these are the basic economics of a good package. Each of our packages must square with these points.

1. **Type of container.**
2. **Cost of container.**
3. **Labor cost of packing the unit.**
4. **Ease of handling and storage in our plant.**
5. **Freight charges.**

Next, we examine the Consolidated Freight Classification to see what type of container we can use under present rulings. Since we must abide by the CFC, its requirements influence our package development work.

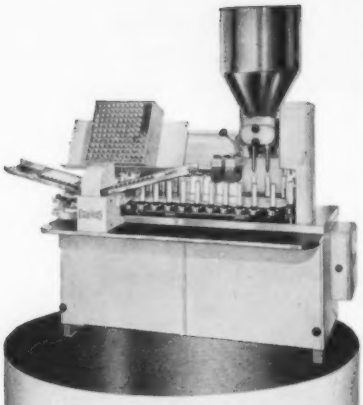
In considering alternative containers, it often happens that one costs less than another, but involves an actual labor cost of packing that is higher. Therefore, we use the cost of the unit packed *in its container* as our basic figure for our computations.

So we choose our container and develop the complete package for our unit. After making, assembling, and setting up a sample, we call together our packaging committee. It includes our director of purchases, steel equipment division manager, new products research manager, assistant to the vice president of production, and the package engineer.

Make Test Shipments

Once this group approves a package, we ship one or more units

Charles F. Stuart has been with Lyon Metal Products, Inc., 22 years. Prior to becoming package engineer two years ago, he was a supervisor in the packaging and shipping department. Following his graduation from high school and prior to joining Lyon, he was for three years a silk screen operator at W. P. York, Inc. His industry association activities include participation in American Management Association packaging programs.



Fill and seal 6000 tubes an hour-

and never worry about downtime

Whether you operate one of Arenco's new, improved high speed automatic tube fillers such as the Model GAN shown here, or one of the "standard" units, you can be sure of day-after-day operation without constant maintenance.

For Arenco tube filling equipment is built to last . . . to free the manufacturer from the job of maintenance and help him fill more tubes in less time.

The GAN is typical of the Arenco line. It handles tubes measuring 1½ inches in diameter and up to 7¼ inches long. It will fill collapsible tubes with cosmetics . . . foods . . . creams...drugs...lubricants...paints.

Magazine is automatic . . . so is filling action, and special equipment makes it easy to transfer tubes from cartons to channels.

To learn more about Arenco equipment and how it can help solve your tube-filling problems, just drop us a line. We'll be glad to send you complete, detailed information. No obligation, of course.

ARENCO

ARENCO MACHINE COMPANY
INCORPORATED
25 West 43rd St., New York 36, N. Y.
Manufacturers of filling, capping, sealing & packing machines

Fig. 1. This foreman's standing shop desk illustrates the bulky nature of typical Lyon products. For this, as with other items, package planning started while the product was still in its paper stage.

from our Aurora plant to our Eastern plant at York, Pa., in a carload shipment. Upon arrival at our York plant, the package receives careful inspection for visual damage only. Subsequently, we receive a report on the condition of the package as received.

Then it is returned, LCL, without being opened. Upon arrival, our packaging committee again meets to make a complete inspection of the package and its contents. As a rule, if there is no damage, we adopt the package at that point. However, our consideration does not end there. If the product passes this kind of testing, we check further to determine if it is overpacked.

In this case, we usually make another test—leaving out some of the packing. This indicates just how much interior packing we can do without. On the other hand, if there is serious damage to the unit upon arrival of the initial test shipment, we change the construction of the package or the interior packing material, depending on the nature of the damage.

We test-ship every new or revised package at least three times. We think it is far less expensive to damage a few units ourselves than to have many units damaged in shipment, resulting in dissatisfied and lost customers.

Frequently we take advantage of our container suppliers' know-how by sending them new or revised packages to put through the National Safe Transit Committee tests. Often the knowledge and experience of the specialists making these tests and the results attained enable them to spot specific package weaknesses more quickly than we can.

How Procedure Works

Applying this basic procedure to our standing shop desk, we first check the Consolidated Freight Classification. It gives us a choice of a crate or a three-piece 350-lb. test corrugated box with wood platform in the bottom. It is at

this point that our attention to costs of the unit *as set up* become important. We found in this case that such costs were less in the crate than in the corrugated box.

Further, with our handling equipment, the crate was easier to handle than the box. So we chose a crate because the additional freight cost resulting from the few pounds' difference in added weight wouldn't offset the difference in cost, but also because we can make crates as we need them in our plant, while we would have to store fabricated corrugated boxes.

We also found that the cost of the unit knocked down in a crate was only slightly less than the unit set up in the crate. We decided the difference (plus the freight charges to the customer saved by shipping K.D.) was not enough to offset the cost of inconvenience to the customer in setting up a knocked-down unit. After securing all data, we decided the best package would be the unit set up in a crate, even though it would be easier to handle and require less storage space if packaged K.D.

We made an engineering change on the back assembly so that we might later try test-shipping the unit K.D. in a corrugated box. Such future possibilities are always present. For example, when a test shipment in a box on such a product proves satisfactory and the cost shows enough savings, we then apply to the Western Weighing & Inspection Bureau for a permit to ship our product in a corrugated box K.D.

Choose Form Crate

Having settled on a crate, we faced additional questions. What type of crate should we use? A form crate (consisting of top, bottom, sides, front, and back) or a drop-in crate? Because of the weight and size of the desk, we chose a form crate over the drop-in crate in this instance. (See Fig. 3.)

It is much easier to set the desk on the bottom of the crate and

when you pack and ship

SOFT GOODS

It's quicker to bag soft goods than wrap them. You save on packing and handling costs. Your product is safer, too. More satisfied customers; fewer damage claims.

The towels shown here are hand folded, mechanically compressed and pushed into paper bag by a plunger. Label covers air-escape vent at bottom. It also acts as dustproof seal—assures factory-fresh delivery; locks out dirt during storage.

Today, thousands of different products are shipped in convenient, low-cost paper bags. See how you can save on materials, handling, freight and warehousing. Write for your free copy of Booklet CP-1.

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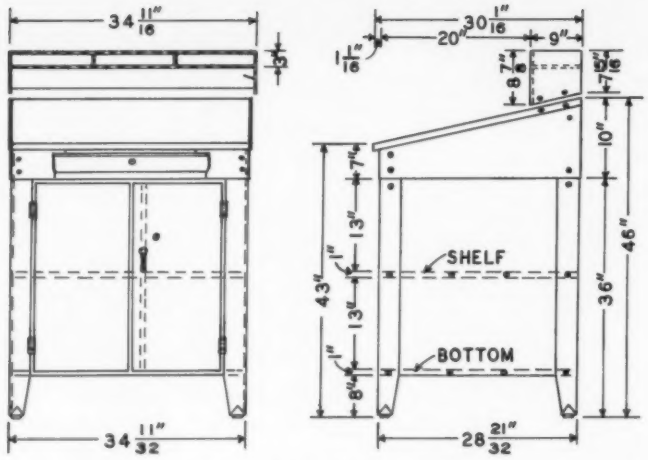


Fig. 2. Standard practice is to prepare detail drawings of all components, as well as an assembly drawing of completed cabinet. Such drawings are essential to correct estimating of packaging costs. Because of packaging costs being part of estimating, it is necessary to start package planning while item is still on paper — and to provide for estimating alternative packaging methods.

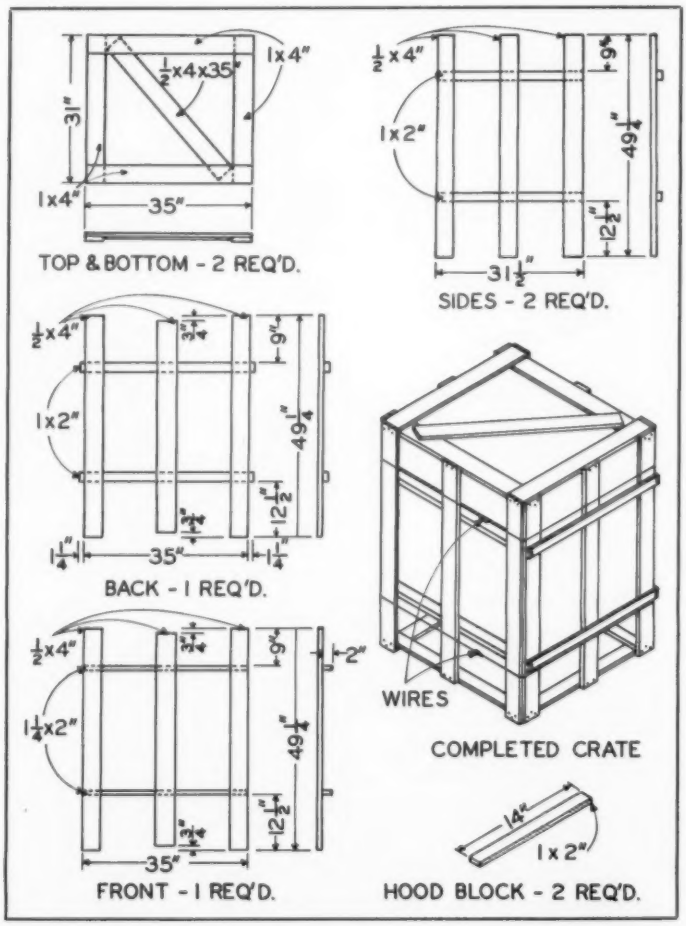


Fig. 3. Weight and size of desk dictated choice of form crate over drop-in crate. Ease of setting desk on crate bottom and nailing parts around it, rather than lifting desk and placing it in crate, was important factor.

nail the parts around it than to lift the desk and place it in the crate. In designing this particular form crate, we removed the hood from the top of the desk and fastened it to the bottom of the crate with two 1×2×14 in. boards. In this way we cut the height of the crate by 7½ in. and the displacement of the crate by 5 cu. ft. At the same time, we reduced the chance of damage occurring in shipment.

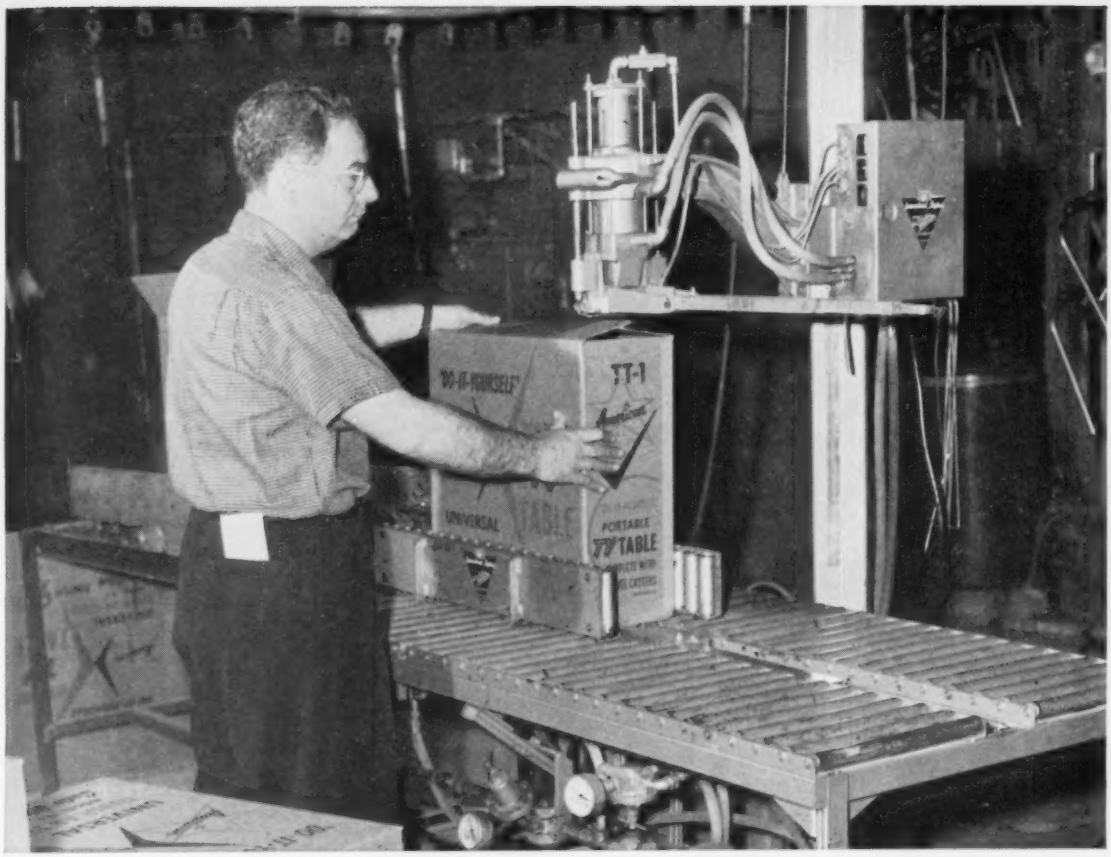
To protect the handle on the door and to keep the door closed, there are two ¼ × 2 × 35 in. boards that fasten to the front section of the crate when made. To protect the finish of the desk there are two pieces of bogus rag creped paper that drape over the desk front to back and side to side. Also, for added protection, a sheet of single face corrugated goes over the front of the desk.

Try Corrugated Box?

Although we chose the crate, we also experimented with corrugated box design. In working out a box for this unit set up, we removed the hood from the top and fastened it to the platform in the bottom. We used interior packing consisting of four corner fillers, one top filler (to offset the slope of the desk top), and one filler over the handle for protection and also to hold the desk drawer closed.

Under present rulings, this desk when shipped K.D. must go in a crate. In constructing a layout of parts in order to ship the desk this way, we had made several engineering changes in the construction of the unit to properly fit the package design.

Interior packaging material for the K.D. unit consists of two pieces of paper, 36 × 100 in., and two pieces of paper 36 × 18 in., to line the crate. Two sheets of paper and two sheets of single faced corrugated 36 × 44 in. serve as padding. Two pieces of ¼ × 2 × 45 in. and one piece of ¼ × 2 × 35 in. serve as blocking. Also, we used one filler between the front and hood of the top. *(End)*



International Stapling Equipment

Replaces 4 other carton-closing methods

to Cut Labor Costs in Half . . . Close 400 More Cartons Per Day!

This manufacturer of automotive accessories, TV tables, house carts, etc., had tried all the familiar methods of carton closing — including taping, gluing, hand stapling, taping and wire stitching combination.

Then the International Dual Stapler was installed and cartons were closed by International Gold Crown Staples.

The advantages were immediate. Previous methods required two people to produce 1100 cartons in an 8-hour day. The International Dual is closing 1500 cartons in the same time, with just **one** operator. (Nor is this anywhere near capacity for this machine, capable of closing 500 cartons **per hour**).

Efficient use of labor . . . increased production . . . a centralized packaging department . . . and cartons securely closed with large steel staples—all add up to a modern dollar-saving packaging method. Why not call your International Representative now? Ask him to show you how you can streamline your operation to meet today's competition and rising costs. There's an International Stapler for every size operation.

International Staplers

INTERNATIONAL STAPLE & MACHINE COMPANY

Originators of Carton Closing Staplers

P. O. BOX 270 • HERRIN, ILLINOIS

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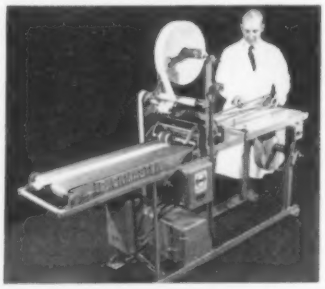
Announcements of machinery and products

1. Beneath each announcement is a code number. As you select items on which you want more information *note* this number.
2. Now, *circle* the corresponding numbers on the postcard, located inside back cover.
3. Next, *fill* in your name and address.
4. Then, *mail* the card – we pay the postage.

Automatic Wrapping Machine

Sundstrand Machine Tool Co. has a new machine, Packmaster Model 56, for packaging long, irregular objects. It handles objects from ¼ in. to 2 in. thick, and packages them in cohesive paper up



to 12 in. wide. Parts are placed between soft sponge rubber rollers and fed automatically through the wrapping, cut-off and marking stations. The finish wrapped part is ejected into a shipping container or onto an exit belt. The machine's rollers squeeze the cohesive paper strips together around the part being packaged to form a tight, conforming wrap. The cut-off knife is actuated when the rider bar drops after passing over the end of the part. Machine speed is adjustable from 0 to 120 ft/min. by means of a variable speed drive. Circle No. 1.

Liquid Filling Unit

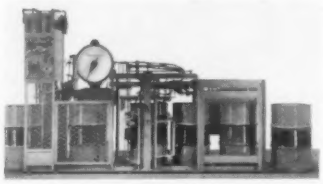
Arthur Colton Co. has a new high-speed liquid filling unit featuring a combination plunge-fill and container-centering nozzle. Unit includes a multiple liquid filler with patented Exacto-metric metering cylinder and valve assemblies that maintain filling accuracy to within one per cent on each fill, a bottle conveyor, and an air-operated escapement. Adjustable "suckback" control on the metering cylinder gives clean, drip-free filling plus positive centering of the container for the plunge-filling operation. Each nozzle has spring-loaded plastic aligners that contact the containers as the nozzle assembly is lowered by a drum cam mechanism driven from the filler motor drive. Centering of containers for filling is independent of minor size variations in containers themselves. Models range from 40 to 480 fills/min. Circle No. 2.

Temperature Controls And Heaters

Electronic Processes Corp. of Calif. announces availability of its electronic temperature controls and heaters for food packaging machinery through Western Waxide Div., Crown Zellerbach Corp., who will sell the electronic equipment along with special machinery it has developed to adapt high-speed machines for wrapping bread with its new Crown-Seal polyethylene film. These temperature controls and heaters have been designed for simple maintenance and, according to Western Waxide, they provide positive temperature controls for food packaging equipment. Circle No. 3.

Automatic Drum Filler

The Rucker Co.'s new Automatic Drum Filler features a patented tare weighing mechanism, an automatic cut-off which assures filling of any type drum with precise accuracy, and a single lance mech-



anism raised and lowered by a single hydraulic cylinder which eliminates synchronization problems. Machine can handle 55-gal. or 30-gal. drums and has capacity for filling more than 1000 55-gal. drums/8-hr. shift. It is a two-station machine operating on a continuous basis. As empty drums are fed to the unit by gravity conveyor, the machine automatically locates and aligns the bung openings at the first station, then positions the drum for filling by means of hydraulically actuated rollers. As drum moves to second station, weight variation, which can be as much as 6 or 7 lb. per drum, is automatically compensated for by the tare weighing mechanism. The filling lance automatically lowers into the drum, and submerged filling begins at rates up to 275 gal./min. Over filling is prevented by automatic reduction of flow. Circle No. 4.

"Electric Eyes" For Quality Control

Photomation, Inc. announces new applications of miniaturized "electric eyes" for quality control

which involve dual light beams. One beam times the inspection and the other beam monitors. The beams may be direct light cut-off or reflected, or a combination. To pass inspection, both beams must concur. Circle No. 5.

Printing Diewheel

Adolph Gottscho, Inc., has developed a "zip-change" printing drum or diewheel that permits entire lines of copy to be removed and replaced in seconds. The diewheel, for use on Gottscho's redesigned line of "Rolacoder" case-marking attachments, accommodates "zip-change" brass-back rubber dies and allows any individual line to be changed without disturbing other lines. It has a vertical line of fixed posts at

Peters

Model CCY Carton Folding & Closing Machine automatically closes up to 150 cartons per minute

Let our engineers show you how Peters can help you do a better job faster—and at lower cost!

Peters Model CCY Carton Folding and Closing Machine automatically folds and closes unlined cartons. Model CCY-L closes lined cartons. Carton size range: 3½" x 2" x 1 3/16" up to 12¾" x 7" x 4½". Write for colorful catalog of Peters diversified line of high-speed packaging machines.

For 60 years originators and builders of high speed automatic packaging and bakery machines.

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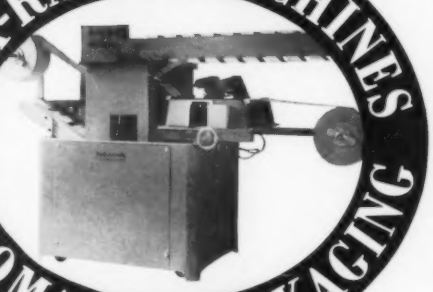
PAK-RAPID MACHINES AUTOMATIC PACKAGING



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THREE TYPES OF PACKAGING MACHINES
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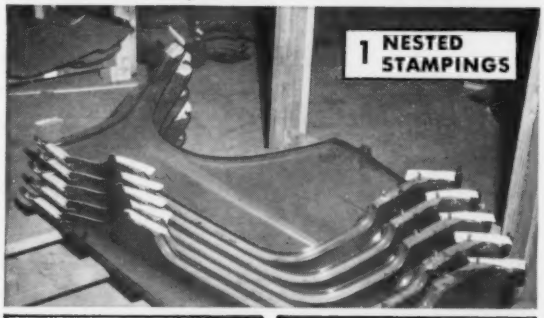
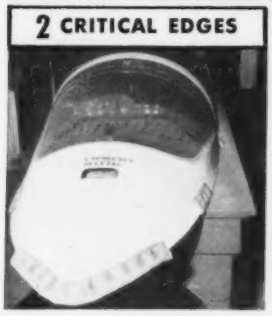
New Use-Reports Show

HOW EDG-PAK PREVENTS DAMAGE, SAVES MONEY!





1 Nested Automobile Stampings. Sharp flanges don't sheer or punch through Edg-Pak's "Strength of Steel" wire inner construction. Adjoining surfaces are fully protected. Edg-Pak doesn't fall off . . . Spring-Grip holds tight—speeds up handling—reduces manpower needs!

2 Critical Aircraft Edges. Edg-Pak slips over edges fast. Spring-Grip holds securely. Cushioned 3-way "Strength of Steel" construction improves top, bottom and side protection of critical edge. Reduces damage, speeds handling—Edg-Pak's "Strength of Steel" saves labor and materials!

3 Steel Strapping. Prevents sharp edges from cutting through to damage corners or printed surfaces. "Velvet Glove" cushioning prevents marring or scratching. Spring-Grip speeds up both "spot" and length protection applications.

WRITE TODAY!
For New EDG-PAK Card with Sample Materials, Specifications, Price List

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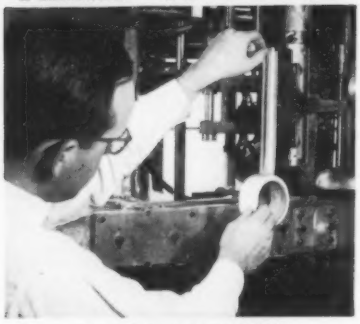
TEMP-R-TAPE®



Apply TEFLON* in seconds

End Sticking on heat sealing bars, flat plates, forming dies, guide rails, chutes. Just press Temp-R-Tape (pressure-sensitive Teflon tape) into place as shown above. Odorless, tasteless, non-contaminating. Good −100°F to 500°F. Recommended by film, paper and machinery producers.

* *du Pont T.M.*

FREE SAMPLE and data. Write, phone or use inquiry service.

CHR THE CONNECTICUT HARD RUBBER CO.
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Good news for users of tape

Here's the latest idea in sealing cartons... the DIAL-TAPER. You dial the length of tape and the DIAL-TAPER does the rest automatically ...measures tape accurately, moistens tape with warm water and cuts off clean.

Users report "up to 50% saving in TIME, 25% saving in TAPE, plus stronger, neater package. Tape sticks tight with one pass of the hands." Used by U. S. Government, Ford, General Electric, all types of business.

For free booklet DT-5 write to Marsh Stencil Machine Company, Belleville 34-A, Illinois.

T-23

one position and spring-loaded posts at another. Dies, equipped with brass eyelet fasteners at both ends, are slipped on or off the posts. Dies are made in logotypes of complete wordings or with channeled face designed to receive individual letters or figures. Circle No. 6.

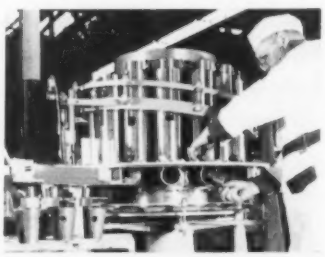
Former, Filler And Sealer

Wright Machinery Div., Sperry Rand Corp., has developed the Advanced Bagmaster system which produces pillow-type packages, single or double walled, from rolls of plain or printed stock.

Sizes range from 2½ in. to 8 in. wide, and from 3 in. to 14 in. long; speed ranges up to 50 pkgs/min. A design feature is its height of 7 ft. The Hytronic, an electronic weight detector, is temperature compensated and makes weighing an integral part of the system. Material stock roll is automatically formed into tube; product is net weighed by Hytronic and discharged into material tube. Filled tube is sealed and cut, forming a pillow-type package. Finger tip controls provide instant change of sealing pressure and temperature. End seal jaws and cut-off knife are electronically controlled. Then package is discharged onto a conveyor. Circle No. 7.

Piston Filler

The Pfaudler Div., Pfaudler Permutit Inc., says their RP-214, a new 14 station Rotary Piston Filler, reduces height changeover



time up to 80% because bowl and cam ring remain undisturbed during adjustment. Designed for ± 1/10 fluid oz. accuracy at filling speeds up to 400 cams/min., the RP-214 handles semi-viscous to semi-solid products ranging in consistency from evaporated milk to potted meat. Tin, glass, or composition containers can be handled in capacities to 32 oz. or to # 404 can diam. (51 oz. with special cylinders and pistons). Operator (1) raises pistons and removes valve plugs, (2) turns filler bowl to new height. Spacer ring is adjusted by rotating bowl. (3) Piston and valve cam ring are set by adjustable support leg screws. (4) Valve plugs are replaced and pistons lowered into position. (5) Valve cam ring access door is closed and machine is ready for production. Circle No. 8.

Electric Gummed Tape Dispenser

Derby Sealers, Inc., announces a new model electric gummed tape dispenser designed to deliver up to 4 pre-determined lengths using a remote control and a random length control. Ideal for production line taping, the controls can be operated by foot treadle or remote control switches. It dispenses 4 lengths of reinforced or kraft tape, up to 60 in. long and 4 in. wide. Features are: major electrical components in removable control box with one multiple prong plug, on-off pilot light indicators, patented floating shear-type knife, removable upper blade for easy cleaning. Circle No. 9.

"King Size" Carton

Tri-Wall Containers, Inc., has developed a light-weight, strong, "king-size", box carton, called

"King-Pak", which enables packagers to consolidate small packages into one large container. It consists of four lightweight units: a half-slotted, lower carton; a larger slip-over sleeve, which holds same amount as lower one; corner-cut tray which serves as final cover; and wooden skid on which carton is mounted. All units except skid are constructed of high-strength triple-wall corrugated board. Circle No. 10.

SUS-RAP SIMPLIFIED PACKAGING FOR FRAGILE PRODUCTS

Eliminates Folding of Pads

SUS-RAP is produced in widths, slot sizes, and various strength qualities to ECONOMICALLY package YOUR product . . .

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For more information circle No. 279 on Card

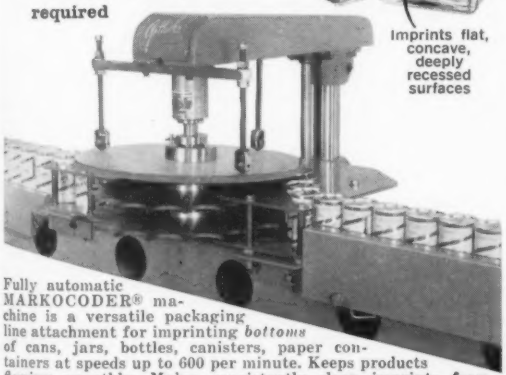
High-speed, Conveyor-line

CODE IMPRINTER

for cans, jars, bottles

Fits in minimum space on any line . . . no line-cutting or dead plates required

Imprints flat, concave, deeply recessed surfaces



Fully automatic MARKOCODER® machine is a versatile packaging line attachment for imprinting *bottoms* of cans, jars, bottles, canisters, paper containers at speeds up to 600 per minute. Keeps products flowing smoothly. Makes consistently clean imprints from rubber type and fast drying fluid ink. Designed for quick code changes, simple maintenance, easy adjustment for different size cans. Install it yourself in a few hours.

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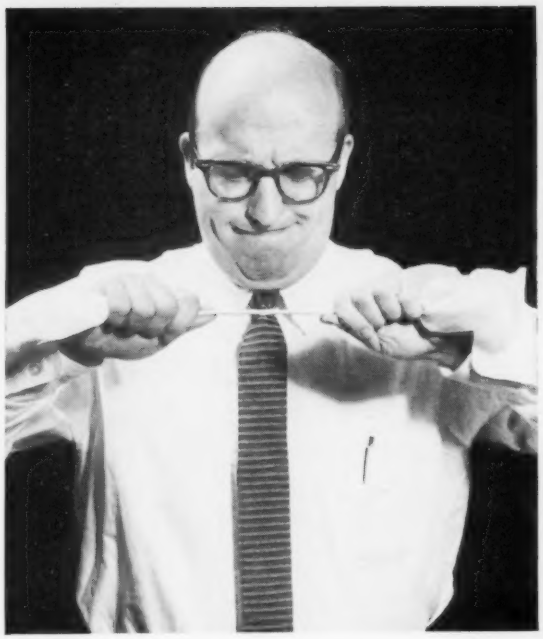

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Here's just one example of many special tissues developed by Crystal to fit customer needs. Strong as a fabric after twisting, this tissue is available in white and colors and can be woven into dozens of unusual convertor products. If you need tissue that can be sewn, laminated to films and foils, impregnated with chemicals, or meet other special requirements, send the coupon below for technical information.

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For more information circle No. 281 on Card

Industry literature available free

1. Beneath each announcement is a code number. As you select items on which you want more information, *note* this number.
2. Now, *circle* the corresponding numbers on the postcard, located inside back cover.
3. Next, *fill* in your name and address.
4. Then, *mail* the card — we pay the postage.

Net Weight Scales

Hayssen Manufacturing Co. describes its automatic net weight scales in a 4-page bulletin. Featuring a Triple Vibrator feed for maximum accuracy, these machines are available in 2, 3, 4, 5, or 6 scale units. Circle No. **101.**

Filling And Labeling Machines

MRM Co., Inc., offers specification sheets on its overhead drive vacuum and gravity fillers. Features are: automatic intake and discharge conveyor, variable speed drive, automatic overflow, quick adjustment to all sizes and types of containers. MRM's continuous motion, fully automatic labeling machine features speeds from 40 to 150/min., label range from "postage stamp" size to 6 in. wide x 7 in. long. Circle No. **102.**

Vacuum Forming Machine

Comet Industries offers complete information on its vacuum forming machine, the Comet Star. Plastic sheet forming, straight drape and vacuum forming, inverted drape and vacuum reverse, and ring and punch forming are some of its applications. Two counteracting platens are electrically driven and independently controlled. Each has a separate vacuum and air pressure system. Basic operation consists of automatic withdrawal of super-heated plastic sheet from an enclosed oven to molding area. Sheet is evenly heated on both sides. Either or both platens are used depending upon chosen forming techniques. Circle No. **103.**

Bag Packer

Bemis Bro. Bag Co. offers Bulletin No. 266-A which contains description of operation, design features and engineering specifications of the Jumbo Packer-Ette. Its features include an enlarged supply hopper and feeder tray, stainless steel product contact surfaces and optional agitator. Designed for medium-sized packing operations, it fills and weighs up to eight 100-lb. bags/min. at an accuracy within ± 2½ oz. Circle No. **104.**

Cellophane Opening Tape

Dobeckmun Co. has an 8-page, illustrated booklet, "How to Use Zip-Tape." It gives information on storage conditions, duration, handling on and off machine, breaks and splicing. Circle No. **105.**

Unsupported Thermoplastic Films

Ludlow Papers, Inc., is offering a folder containing samples and specifications of 7 of its new plastic films produced by the Flex-L process. Among the films included are those made from low, medium, and high density polyethylene, nylon, polypropylene, and two foamed products — orthofoam and metafoam. Circle No. **106.**

Heavy Products Shipping

Hinde & Dauch has a booklet entitled "How to Ship Heavy Products in Corrugated Boxes." Such things as bolts, nails, pumps, sewing machines, and other heavy products are now being shipped in corrugated containers, as described in this booklet. Circle No. **107.**

Polyethylene Film

Spencer Chemical Co. has published a comparative film property data sheet. It compares its "Poly-Eth Hi-D" 2504 with conventional density polyethylene in respect to such characteristics as melt index, tensile strength, elongation, tear strength, etc., and refers to the ASTM test methods used. Circle No. **108.**

Cappers And Sealers

Resina Automatic Machinery Co., Inc., has a gate-fold brochure showing ten different models of its line of bottle and jar cappers and can sealers. Semi-automatic and fully automatic models are described. Speeds range from 20 to 200/min. Circle No. **109.**

Fibre Cans

R. C. Can Co. manufactures a wide range of convolutely wound and spirally wound fibre cans that are illustrated with specifications in an 8-page catalog. These packages are available in square, oval, round, and oblong shapes. Twelve different specialty metal-end tops are pictured, as well as illustrations of seven kinds of moisture and grease resistant wraps and liners available. Circle No. **110.**

Bag Closers

George H. Fry Co. has published a 4-page illustrated folder that gives specifications and operating features of four different models of bag closing machines. These are continuous motion machines that will close and seal paper bags up to 3-lb. capacity. It handles bags made of kraft paper, waxed paper, plain or waxed glassine, foil and paper combinations, using either adhesives or the heat-seal method. Circle No. **111.**

Tape-Binding Attachment

Dave Fischbein Co. has a Catalog-File of its bag closing equipment, which includes detailed information on its tape-binding attachment for the Fischbein portable bag-closing machine. This attachment, known as the Faseal, produces tape-bound closures on all types of multiwall paper bags. An attached knife severs tape and thread simultaneously after the closure is made. The bag closer, with the Faseal attachment, can be used as a completely portable unit or in suspension from a counterbalancing Fischbein suspension unit. Circle No. **112.**

Automatic Cartoning Machine

Container Equipment Corp. has recently published a 4-page illustrated brochure describing the Ceco Model 45 automatic cartoner. Moderately priced, it automatically handles the carton from hoppering through closing. This unit handles any carton from light paperboard to heavy fibreboard in either glue or tuck style construction at speeds up to 140/min. Circle No. **113.**

Stapling, Tacking Units

Fastener Corp. offers a 28-page catalog which describes and illustrates its complete line of Duo-Fast manual and air-operated stapling and tacking equipment. Model numbers of each item, the type of staples that may be used, and special features for different users are included. Description of guides, attachments, and other accesories available are enumerated. Circle No. **114.**

High Speed Wrappers

Elgin Manufacturing Co.'s 6-page bulletin enumerates specifications with photographs of the Model GSA fully automatic wrapping machine which is available in three models. Designed to handle heat sealing cellophane, waxed paper, aluminum foil, and glassine, this machine is adjustable within a speed range of from 10 to 80 pkg/min. Package sizes handled range from 3 to 12 in. long, 1 to 7½ in. wide, and ⅝ to 3 in high. A flow chart is included that shows the sequence of folding operations. Circle No. **115.**

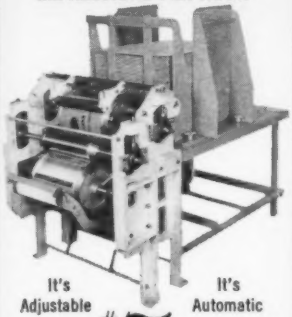
Polyethylene Paper Coating

Eastman Chemical Products, Inc., has published Bulletin No. F-101 describing "Epolene C," a low molecular weight polyethylene resin specifically designed for use in the packaging field. Its chief characteristic lies in its ability to be roll-coated as a hot melt, yet it retains tensile and chemical properties. It also can be applied as the major or minor component in 44 different wax or resin blends. Compatability, melt viscosity, and cloud point charts are included in the brochure. Circle No. **116.**

Rotary Heat Sealers

Doughboy Industries, Inc., offers an illustrated folder on its heavy-duty rotary sealer for cellophane, glassine, moisture barrier materials, foils, coated papers, and the like.

INPLANT PRINTS UP TO 3000 IMPRESSIONS PER HOUR



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For production line marking, dating and coding of multiwall bags, cartons and bulk containers.

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Completely automatic and electronically controlled, the Autoprinter works right with your production line . . . at speeds up to 3,000 neat, legible impressions per hour regardless of surface variation! Saves inventory, pre-printing, storage costs. Uses interchangeable rubber type, requires minimum of attention. The Autoprinter has been engineered and built for effective performance . . . and with proper care, will give you a lifetime of service.

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Circle No. 282 on Card

Half-tones and line drawings illustrate sealing details, equipment features, and types of bag top folders. Specifications and machine features are set forth. Circle No. **117.**

Labeling Bags And Overwraps

Dennison Manufacturing Co. offers a new bulletin describing the "Therimage" labeling process for bags and overwraps. It is the direct thermal-transfer of an ink legend to the packaging material at the packing station; it is applied automatically and instantaneously. Circle No. **118.**

Automatic Case Sealer

Crompton & Knowles Packaging Corp., Russell Div., manufactures an automatic case sealing machine that is described in a 4-page bulletin. Featuring rugged construction and quick changeover, this unit glues either top or bottom flaps or both, handling box sizes from 5 to 15 in. wide, 4 to 15 in. high, 8 to 20 in. long. Circle No. **119.**

Carton Filling And Sealing

Clybourn Machine Corp. describes its Model C continuous automatic carton filling and sealing machine in Bulletin No. 21. The machine packages granulars, powders, bagged products, and long cut products, such as spaghetti and macaroni. Speeds range up to 60 cartons/min. Five models handle carton sizes ranging from 3 to 2 in. wide, ¾ in. thick to 14 in. high, 10 in. wide, 5 in. thick. Circle No. **120.**

Pressure Sensitive Labeler

Avery Adhesive Label Co. has published a specification sheet on its automatic pressure sensitive labeler. Labels are fed from a roll, and the machine applies them into a registered position on flat, rounded, or concave surfaces. Standard machine handles labels from 2½ to ¼ in. wide, at speeds of 40 to 300/min. The machines may be modified to handle labels up to 6 in. wide. Circle No. **121.**

Printed Tape

Central Paper Co. offers a brochure, "Safetex Printed Tapes," which features samples of its printed gummed tapes. The Safetex quality control program is discussed and the brochure also explains how business firms can get individual art sketches from Central's design department. A list of distributors is included. Circle No. **122.**

Box Bottomer

Bostitch has a box bottom stapler which staples the entire box bottom in one operation with copper finish staples. Unit handles 4,000 staples without reloading. Staple and machine specifications are included in data sheet. Circle No. **123.**

Packaging Film Adhesives

National Adhesives, Div. of National Starch Products, Inc., has a handy booklet describing how to handle adhesives for transparent films. The characteristics and applications of lacquer, hot melt, and solvent activator adhesives are explained in detail. There is a discussion of problems relating to penetration, aging, and storage as well. A spearate chart is inserted which reviews 14 different transparent films, listing their means of identification, their manufacturer, trade name,

A NEW WILEY BOOK

How to design it right

PACKAGE DESIGN ENGINEERING

by KENNETH BROWN, Space Technology Laboratories, Ramo-Wooldridge Corp., and Lecturer, UCLA.

Truly the first of its kind, *Package Design Engineering* works upward from the elements, to make the book understandable and useful to the non-engineer as well as the trained man. Actually, high school algebra and trigonometry are all the mathematics required.

Starting with a review of elementary mechanics and stress analysis, this new book shows many practical applications of theory. The problems, for instance, are taken from case histories of large companies faced with various packaging difficulties.

Four Features

1. Covers such subjects as dehumidification, pressurization, testing procedures, and instrumentation as applied to package design. It's the only book to do this.

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3. Gives basic, practical applications of structural analysis for designing outer containers.

4. Treats both military and commercial applications and specifications, and structural analysis for domestic and export shipping.

A volume in Wiley's Materials Handling and Packaging Series, James R. Bright, Editor.

Ready April 1959 Approx. 282 pages Prob. $8.50

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Circle No. 283 on Card

thickness, types, and characteristics. Circle No. **124.**

Straight Line Filler

The Filler Machine Co., Inc., offers an illustrated data sheet on the Model SL-55 straight-line filler. This is designed to handle semi-liquid and semi-solid products such as jellies, mayonnaise, salad dressing, cosmetics, pharmaceuticals, petroleum, and chemical products. Five types of ths model are available offering speed ranges up to 300/min. It is constructed to handle ½ to 32 oz. glass, metal, and plastic containers. This unit features air-operated valves that cut off instantaneously regardless of the cycle speed, a no-container—no-fill device, and stainless steel construction of contact parts and parts around the filling zone. Circle No. **125.**

Electronic Checkweigher

Bartelt Engineering Co. has released a 4-page brochure describing its electronic checkweigher. Variations in weight of 1/64 oz. actuate the segregation gate classifying the packages by weight at speeds up to 200/min. All electric control elements are in a separate console mounted on casters that can be removed from the area during cleaning operations. Circle No. **126.**

Cast Vinyl Film

Bakelite Co., Div. of Union Carbide Corp., has an 18-page brochure describing Krene cast vinyl film. The brochure reviews the chemical and physical properties of Krene and lists the applications for twelve different grades of the film. Krene is heat-sealable and can take printing inks. Technical data on this film is included in the brochure. Circle No. **127.**

Polyvinyl Resin Adhesives

Armour & Co.'s Adhesive Div. has released a 4-page brochure on its Seban line of polyvinyl resin adhesives. Brochure illustrates several actual uses of Seban and lists some of the gluing machines on which Seban is used. Circle No. **128.**

Collapsible Metal Tubes

A. H. Wirz, Inc., has released a comprehensive manual devoted to the proper selection and use of fold-up metal tubes. This 32-page handbook includes data on such specification factors as tube size, tube openings, tube closures, and tube liners. Selector charts serve as guides in determining the compatability of various products with such tube metals as aluminum, tin, lead, and special alloys. Circle No. **129.**

Corrugated Shipping Boxes

Stone Container Corp. offers a 16-page illustrated booklet, "How to Select the Proper Container for Your Product." The booklet contains sections on the right test of paperboard, best construction, checkpoints for adequate protection at minimum cost, best size, best handling, etc. Also included are tables on economical dimensions and on container test requirements for express shipments. Circle No. **130.**

Vial Labeler And Coder

Potdevin Machine Co. offers a data sheet on the Corliss automatic labeler and coder for vials and ampules. This machine both labels and codes automatically in the same operation at speeds up to 46 vials or ampules/min. Unit applies either spot or wrap-around labels. A coding device prints lot number, batch number, etc., anywhere on the label. This portable machine weighs 47 lbs. Circle No. **131.**

Counting And Imprinting Machine

Pitney-Bowes, Inc., offers two pieces of literature describing the Tickometer, a counting and imprinting machine for automatically counting, dating, coding, and imprinting labels, tags, cartons, etc., at speeds from 500 to 1,000 pieces/min. A 10-page brochure, "Your Employees' Time Is Too Valuable to Waste," gives specifications and operating features of this machine. A separate bulletin of twelve case studies of savings attributed to the use of this unit is also included. Circle No. **132.**

Carton Printer

E. L. Bivans, Inc., describes Model 321 carton printing attachment for its carton set-up machine in a data sheet. This unit prints single or multiple lines in either direction within a 1½ x 1½ in. area. Cartons may be printed on right panel, back panel, or top panel. Type changes can be made in two minutes. Circle No. **133.**

Acetate Fibre Tapes

Minnesota Mining & Mfg. Co. has published a 6-page illustrated bulletin describing its "Scotch" brand acetate fibre tapes. These are tapes with a cellulose acetate film backing which is reinforced with rope paper tissue. They are resistant to moisture, have high adhesion, are long-aging, and are available in twelve colors or transparent. A table is included which lists the thickness, tensile strength, stretch, and adhesion ratings for eight different types of this pressure-sensitive tape. Circle No. **134.**

Versatile Wrapper

Miller Wrapping & Sealing Machine Co. describes its Model MPS wrapping machine in an information sheet. It wraps boxes or open trays of foods, textiles, drugs, stationery, etc., using roll or sheet-fed wrapping materials. It heat seals or glue seals with cold glue. Speeds range up to 21 pkgs/min. Package sizes handled are 2½ to 15 in. long, 1 to 9 in. wide, 12 to 5 in. high. Circle No. **135.**

Dial Tape Dispenser

Marsh Stencil Machine Co., Inc., offer Brochure D7-5 describing its electric dial taper. This machine automatically measures and dispenses any length of gummed tapes from 3 to 39 in., cut off and moistened, ready to apply to container. Circle No. **136.**

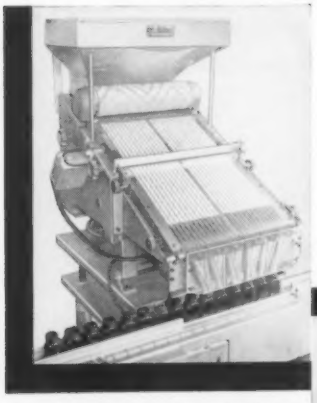
Label Gluer

King Sales & Engineering Co. offers a 2-page bulletin on its Model F6 label gluer. Line drawings illustrate machine details and half-tones show in-plant usage. Detailed specifications are listed for motor- and hand-drive units. Circle No. **137.**

Pallet Cover Materials

Kennedy Car Liner & Bag Co. offers sample sheets of paper and plastic materials used in fabricating pallet covers for protection against dust, dirt, moisture, water, and pilferage. Circle No. **138.**

Fast Filling and Accurate Count



Lakso "48" Tablet Counter

- For compressed tablets and gelatin capsules
- Fills up to 100 bottles of 100's per min. Other models up to 300 bottles per min.
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- Cottons up to 100 bottles per minute
- Extremely flexible to handle wide range of bottles and cotton.

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U.S.I. POLYETHYLENE NEWS

A series for plastics and packaging executives by the makers of PETROTHENE® polyethylene resins

APRIL, 1959 — U.S. Industrial Chemicals Co., Division of National Distillers and Chemical Corporation — 99 Park Ave., N. Y. 16, N. Y.

Packaging Notes

Packaging Show — The 28th Annual AMA National Packaging Exposition will be held this year at the International Amphitheatre in Chicago, April 13-17. Close to 400 companies will have exhibits at the show. More than 35,000 visitors are expected from every state in the union, Canada and several dozen foreign countries. Exhibits will cover the entire range of the packaging industry — machinery, materials, methods, services, design and finished packages.

Running concurrently with the Exposition will be the AMA National Packaging Conference at the Palmer House, April 13-15. Conferees will hear discussion of such subjects as top management appraisal of packaging, utility in package design and special problems in industrial packaging.

Last Packaging Exposition to be held at the International Amphitheatre, Chicago, was in 1957. Show drew visitors from all over the world.

U.S.I. exhibit at the Packaging Exposition will feature a staff of technical experts to answer questions about poly film and packaging problems. As a supplier of polyethylene resins, U.S.I. frequently has been able to make suggestions that have saved packagers the necessity of making costly changes in their operations. Packagers are encouraged to make use of this opportunity to discuss innovations in poly film packaging that have been developed in the past year. Also available at the exhibit will be new application and technical data on cast film. The U.S.I. exhibit will be at Booth No. 1133-1135.

New dual dispensing squeeze bottle is a good example of polyethylene's versatility. Poly bottle dispenses medication via calibrated dropper at one end; nozzle and valve at other end permit use as a squeeze spray. A removable base cap at the nozzle end enables the bottle to be stood on end in the medicine cabinet.

Farm produce is fresher when packaged in polyethylene liners, government researchers report. Cabbages stored in poly-lined crates were found to have lost less than one percent of their weight after a week's storage. Drying out of cabbages stored in unlined crates over the same period resulted in a weight loss of 14 per cent.

Cast Polyethylene Film Makes Big Gains As Ultra-Clear Packaging Material

First Introduced by U.S.I. at Last Year's Packaging Show

A year after it was first introduced to the industry by U.S.I., ultra-clear cast polyethylene film has firmly established itself as a leading transparent packaging material. Cast film is now being widely used to package produce, frozen foods, hosiery, even tortillas and tamales. As an overwrap, cast film is packaging bread, paper plates and towels, napkins, sheets and pillowcases. Production of cast film, now about a million pounds a month, is expected to triple by 1960. At time of introduction, cast film was produced only on laboratory scale. Now approximately six film extruders are making cast film, and another six or eight have plans to produce the film within the year.

Cast film has shown that it can compete successfully with the most popular conventional transparent films in clarity and gloss. And its price is lower than most.

In just a year since its introduction by U.S.I., cast polyethylene film has firmly established itself as a leading transparent packaging material. It is now used to package hundreds of different consumer products.

Uses Extrusion Coating Equipment

Cast film, first announced by U.S.I. at the Packaging Show in April, 1958, is made by a different processing technique than normally used in polyethylene film production. In the process, polyethylene is extruded and drawn or cast across a highly polished chrome-plated roll. This casting step greatly improves the optical characteristics of the film. An immediate and even quenching prevents the formation of haze-producing crystals in the matrix of the polyethylene, and the polished roll surface produces a glossy surface on the film.

In making cast film, choice of resin is important. U.S.I.'s and customers' experience has, in general, shown PETROTHENE 205 — with a density of 0.924, melt index of 3.0 — to have optimum properties for making bags, and PETROTHENE 239 — with a density of 0.929, melt index of 5.0 — to be best for making overwrap film. Where special property combinations are desired, U.S.I. has a variety of other resins that can be used.

Although the equipment needed for making cast film is initially more expensive, production costs are competitive with those for conventional extruded film. Production speed is the same or greater.

Polyethylene Quality Control — I

Melt Index Test Assures Uniform Molding Properties

Melt index is used widely to indicate flow rate of a polyethylene resin. Uniformity of melt index helps assure uniformity of such other resin properties as production rate, low temperature flexibility and resistance to stress cracking.

At U.S.I., melt index of every lot of PETROTHENE resin is determined in accordance with ASTM method D1238-57T. The test in effect measures the amount of heated resin that is extruded through a standard orifice at a given pressure. The melt index of the resin sample is the weight in grams extruded in ten minutes. To insure uniformity within the same lot and from lot to lot, U.S.I. routinely measures the melt index of separate samples taken from various points within each lot.

Processors interested in details of the ASTM melt index test may obtain free copies of ASTM D1238-57T by writing the Editor, U.S.I. POLYETHYLENE NEWS.

Tables Simplify Calculation of Film Thickness, Weight

A new 8-page booklet prepared by U.S.I. enables processors to make quick, accurate calculations concerning gauge and weight of polyethylene film and bags.

The booklet contains simplified tables and formulas for solving such problems as average thickness of film or bag that can be expected when density, weight and dimensions are known; number of feet per pound of film that will be yielded by a roll of known thickness and width; number of bags of a given size and gauge that can be made from a pound of resin.

Copies of the booklet, titled "Formulas and Tables for Polyethylene Film and Bags," may be obtained by writing Editor, U.S.I. POLYETHYLENE NEWS, 99 Park Avenue, New York 16, N. Y.

DO YOU HAVE a new polyethylene packaging development you'd like the industry to know about? Make it routine to send your information on new developments to U.S.I. POLYETHYLENE NEWS.

Address the Editor,
U.S.I. POLYETHYLENE NEWS, U. S. Industrial Chemicals Co., Division of National Distillers and Chemical Corp., 99 Park Avenue, New York 16, N.Y.

Wrapping With Paper

The KVP Co. has issued a booklet, "The Mechanics of Packaging." It describes the best methods of handling flexible protective coated papers in storage and in overwrapping. It also lists the causes of wrapping machine troubles. Circle No. **139.**

Cushioned Shipping Bags

Jiffy Manufacturing Co. offers samples and descriptive material on its line of padded shipping bags. Three new types of bags are now available. They include a padded shipping bag made with a mesh reinforced outer liner, a heavy-duty shipping bag with an outer liner of slick 90 lb. Beaming kraft, and a utility shipping bag, unpadded, constructed of 100 lb. stock. Circle No. **140.**

Multiwall Bag Closures

International Paper Co., Bagpak Div., offers a brochure which demonstrates actual bag end samples of its Cushion-Stitch closure for multiwall paper bags. It is comprised of a twisted kraft paper reinforcing cord that lays across the end of the bag; thread is then stitched around the cord and through the bag. The kraft paper cord forms a cushion that absorbs the strain of handling or dropping and prevents the stitching from pulling through the bag walls. Circle No. **141.**

Marking Machines

Industrial Marking Equipment Co., Inc., has published a catalog covering its entire line of marking, dating, and coding machines. Profusely illustrated, this catalog gives detailed technical data on the Whippet Marker, #7 Autoprinter, Rainbow Coder, and other standard units. It outlines base lock types and logos, as well as showing many of the custom-designed marking machines for special application throughout industry. Circle No. **142.**

Plastic Bottles And Jars

Imco Container Corp. has a 24-page catalog showing its line of stock sizes and designs of plastic bottles and jars. Illustrations give capacities which range from ½ to 16 oz. and dimensions of each style of container. Also illustrated are spray and dispenser plugs for blown bottles and fitments for injection molded bottles. Circle No. **143.**

Automatic Wrapper

Hudson-Sharp Machine Co. has a 4-page folder featuring the Campbell Wrapper. This is an automatic machine handling all types of modern wrap materials, tube forming them around the product. It then simultaneously crimps, cuts, heat or glue seals, folds, and delivers. The machine gently handles hard, soft, and brittle products of regular or irregular shapes without breaking or crushing. It is said to reduce material requirements by 35 to 50%. The unit wraps without boats or stiffeners unless they are desired, and can be supplied with such accessory equipment as code daters, label imprinters, strip opening attachments, etc. Circle No. **144.**

Corrugated Boxes

Hoerner Boxes has a brochure on two new services they are offering to users of corrugated boxes—a product development and engineering laboratory and the services of the National Safe Transit Program. NSTP testing procedures are described and benefits explained. Circle No. **145.**

Can Unscramblers

Dudley Machinery Co. has brochure 152 describing its can unscrambling systems. Specifications on machines to handle both full and empty cans at speeds from 150 cans/min. to 600 cans/min. are given. Circle No. **146.**

Vacuum/Gas Pouch Packaging

Standard Packaging Corp., Flex-Vac Div., offers a 4-page bulletin on the Model 6-12 vacuum or gas pouch packaging machine. Fully automatic, this unit handles luncheon meats, ham, cheese, dried beef, frozen foods, etc., at speeds up to 60/min. Circle No. **147.**

Wrapping Machines

Battle Creek Packaging Machines, Inc. has a brochure on its Model 56G wrapper. The machine seals on narrow edge while retaining normal envelope folds at the ends so that side panels are unbroken and cannot be marred by heat or scratches. Size ranges from 1 to 5 in. high, 2½ to 8¼ in. wide, and 5 to 15 in. long are available. The wrapper handles heat-sealable films and paper at speeds up to 90 pkgs/min. Circle No. **148.**

Wood Preservative

Cellu-San Div., Darworth, Inc., has published an eight-page illustrated brochure that lists specifications and application techniques for Cellu-San, a wood preservative developed ex-

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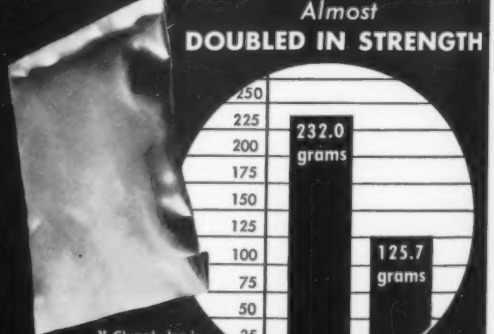

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pressly for the food industry. Containing water repellents and fungicides, this material provides longer life for wooden boxes and pallets; it protects against contamination of fruits and vegetables. Circle No. **149.**

Container Set-Up/Sealer

Container Stapling Corp. has a specification sheet on its "Clip-Top" packer, Model P (pneumatic). This machine closes filled cartons from the outside with king-size staple clips. In addition, the Model P sets up empty containers, ready for packing. It seals any ordinary box for less than 1/3 of one cent in a few seconds time, Container Stapling says. Circle No. **150.**

Plastics Packaging

J-E Plastics Packaging Co., Inc., has a new work book, called "Catalog of Ideas." The book not only includes a catalog of products available, but actually offers a short "seminar" on semi-rigid plastic packaging. It provides complete manufacturing procedures, printing information, and full details to help a designer or purchasing agent obtain all necessary specifications to develop style, size, or other pertinent data on developing a package for a specific product. Circle No. **151.**

Handle Bag Machine

H. H. Heinrich Co. offers Bulletin No. 119 on its Model "CX" handle bag machine. This machine produces handle bags in a continuous operation. The paperweb and the boardweb are fed simultaneously into the machine. As the boardweb is being sheeted and pasted onto the moving paper web, the edges of the paperweb are sheared to form 5/8" wide paste-seams. Then the paperweb is sheeted and the blank folded to form a two-seam bag. A finger grip is diecut into the reinforced top of the bag. Circle No. **152.**

Snap-Action Switches

Micro Switch, Div. Minneapolis-Honeywell Regulator Co., has released Micro Tips No. 25, latest in its series of publications on how plant engineers and electricians are using snap-action switches in their plant operations. Illustrated with drawings and photographs, the brochure contains six methods which can save man-hours, protect operators and machinery, and eliminate waste. The lead story describes how a manufacturer has automated a forming and adjusting machine by use of 25 snap-action switches of six different types. Circle No. **153.**

Coiled Hot Melt Adhesives

United Shoe Machinery Corp. manufactures Thermogrip, a solid thermoplastic adhesive supplied in a continuous cord-like form. This product is described in a four-page brochure. Thermogrip cements kraft and other papers, chipboard, polyethylene films, coated paper, wax-coated paper, aluminum foil, etc. Circle No. **154.**

Nylon Impregnated Paper

Knowlton Brothers offers samples and further information on its grade 538 nylon impregnated paper, which was developed especially for applications requiring wet strength and abrasion resistance. Water permeability of the unpressed paper is 21 cc in 1 min. through a 2" dia. circle and under a head of 2"; after pressing at 250 lb. p.s.i. at 240° F. for 2 min., the water permeability is 12 cc's. Abrasion resistance is said to be maintained in both wet and dry applications. Circle No. **155.**

Resin Adhesives

United Shoe Machinery Corp. has released a 2-page bulletin describing its resin adhesive, Strongbond No. 1. Good stability and resistance to foaming or "balling" when agitated by machinery glue rolls are characteristics claimed for this new resin adhesive. Designed primarily for bonding paperboards, it produces a strong, quick-setting bond under pressure. It does not require heat. Circle No. **156.**

Band Type Heat Sealer

Ralph Chaffee & Co. has an illustrated brochure describing its Rotor Sealer. Used in heat sealing thermoplastic materials through a heated metal band, this machine is available in three models. It features forced water cooling, a thermostat range to 600°F., and operates at speeds up to 315"/min. Sealing widths available are 1/8", 1/2" and 3/4". Circle No. **157.**

Packaging Consultation

Container Laboratories, Inc., has a 16-page illustrated booklet describing its consulting services, research and development, design and engineering, testing, and special studies undertaken. Illustrations show difficult or unusual packages and equipment developed, and actual testing operations and methods. A list of clients and the biographical sketches of key personnel are also included. Circle No. **158.**

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Structural design notes for corrugated containers

Note No. 3: Compressive strength of paperboard — Part II

By K. Q. Kellicutt,
Engineer,
Forest Products Laboratory,
Forest Service,
U. S. Department of Agriculture,
Madison, Wisconsin

Introduction. One way of using the physical properties of paperboards as determined by the modified ring-crush test is for calculating the edgewise crushing resistance of built-up corrugated board. This application demonstrates how the properties of the built-up board, from which boxes are made, are dependent upon the physical properties of the paperboard sheets from which the board is made. In this note, a sample calculation is given to demonstrate the mathematical procedure, along with a comparison between other calculations and actual edgewise crushing test values of various boards, in order to illustrate the close agreement that exists.

In a subsequent note, a second use for the modified ring-crush test will be demonstrated—one that involves evaluation of the results of simpler tests of paperboard, such as the strip-column test and the conventional ring-crush test.

Calculations Based On Results Of Modified Ring-Crush Tests

When calculating the ultimate load per inch of width of a short column of corrugated board from the physical properties determined with the use of the modified ring-crush test, two different formulas are used. If the flutes are parallel to the direction of the applied crushing load, the following formula is used:

$$P = P_1 (h - c)\, a + P_2\, a\, a t_c \qquad (1)$$

in which P is the ultimate compressive strength of built-up board, in lb/in. of width; P_1 is the ultimate compressive strength of the liner, in lb/sq. in., for the across-machine direction; h is the total thickness of the built-up board, in in.; c is the thickness of the core, or distance between the inner surfaces of the liner, in in.; a is the width of the column, in in.; P_2 is the ultimate compressive strength of the corrugating medium in lb/sq. in., in the across-machine direction; a is the ratio of length of corrugating medium when flattened out to the length when corrugated (for A-flute, it is 1.523; for C-flute, 1.477; and for B-flute, 1.3605); and t_c is the thickness of the corrugating medium, in in.

Table I lists crushing strength values for various liners and corrugating mediums. The formula (Equation 1) is used here to compute the compressive strength of board 1-A, Table I. For this purpose, the values of stress of the liners and corrugating medium of board 1-A, which are given in Table I of Note No. 2 (*1*), are used. **The calculated compressive strength of the board for the direction parallel to the flutes is determined as follows:**

$$\begin{aligned} P &= 981\ (0.2003 - 0.1659)\ 1 + \\ &\quad (907 \times 1.523 \times 1 \times 0.010) \\ &= 981\ (0.0344)\ 1 + 13.81361 \\ &= 47.6 \text{ lb/in.} \end{aligned}$$

This value compares favorably with the actual test value for board 1-A, which was found to be 49.8 lb/in. by a short column crush test.

When calculating the strength in a direction perpendicular to the flutes, a different type of board failure is involved and the resistance of the board to compressive forces is dependent upon the stiffness of the short columns of the liner, which are considered as the distance between the adjacent glue lines. The shorter this distance, the shorter and stiffer is the column. For this reason, B-flute boxes are generally stiffer than either C- or A-flute when the compressive force is applied in an end-to-end or side-to-side direction of the box, because its stiffness for these directions is dependent upon the stiffness of the short columns between adjacent glue lines.

The formula used to calculate strength in a direction perpendicular to the flute is

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$$P = S\,(h - c)\,a \qquad (2)$$

where

$$S = F - (F - f)\left[\frac{\frac{l}{r}}{\sqrt{\frac{\pi^2 E}{f}}}\right]^{\frac{2f}{F-f}}$$

and P is the ultimate compressive load of built-up board, in lb/in. of width; S is the stress at maximum load for the liner; F is the maximum compressive strength of the liner, in lb/sq. in., in the machine direction; f is the elastic limit of the liner, in lb/sq. in., in the machine direction; l is the length of the column, in in. (A-flute, 0.333; B-flute, 0.2307); r is the radius of gyration of the single liner, in in. $\left[\frac{T}{\sqrt{12}}\right]$; E is the modulus of elasticity of the liner, in the machine direction; and T is the thickness of the liner, in in.

It is apparent from this formula that the calculations of strength for the perpendicular direction of the board are more complex and involve more manipulations. For that reason the FPL does not suggest that either formula be put to common use. Rather, they are used mainly to substantiate the correlation between strength properties of paperboard and those of a built-up structure. As will be shown in subsequent notes, simple tests and calculations have been developed for use in predicting and specifying box strength to meet certain use requirements.

To illustrate the use of this formula (Equation 2), the strength of board 7-B, Table I, is here calculated. Again, values from Table I of Note No. 2 (*1*) are used.

The first step is the determination of S, the strength at maximum load:

$$S = 857 - (857 - 500) \times \left[\frac{\frac{0.2307}{0.0101}}{\sqrt{\frac{9.87 \times 550{,}156}{500}}}\right]^{\frac{2 \times 500}{857-500}}$$

$$= 857 - 357\left[\frac{22.84}{\sqrt{10{,}860}}\right]^{2.8011}$$

$$= 857 - 357\,(0.2192)^{2.8011}$$

From a logarithmic table, the quantity 0.2192 raised to the 2.8011 power is found to be 0.01424, which, when multiplied by 357, gives 5.08. Subtracting this value from 857 gives 851.92 for S.

Substituting 851.92 for S in Equation 2,

$$P = 851.92 \times 0.035 \times 2 = 59.6 \text{ lb/in.}$$

This value is very close to the actual crushing strength of board 7-B, with flutes perpendicular to the applied load, which is shown in Table I to be 60.6 lb/in.

Similar relationships between the calculated compressive strength of built-up board and actual test values may be seen by comparison of the values in Table I.

As pointed out earlier in this note, the calculations just presented have a purpose in the scheme of developing design criteria for fibreboard boxes, but their main purpose is in the evaluation of simpler testing techniques, discussion of which will be started in Note No. 4.

TABLE I

Comparison Of The Calculated And Actual Ultimate Crushing Loads Of Some A- And B-Flute Corrugated Fibreboards*

Board Number and Flute Size	Liners		Corrugating		Crushing Strength			
					Corrugations parallel to load		Corrugations perpendicular to load	
	Material	Thickness (in.)	Material	Thickness (in.)	Calculated (lb/in.)	Actual test (lb/in.)	Calculated (lb/in.)	Actual test (lb/in.)
1-A..	Fourdrinier kraft†	0.0172	Steamed pine groundwood	0.0124	47.6	49.8	29.5	29.8
2-A..	Fourdrinier kraft†	0.0172	Fourdrinier kraft	0.01018	54.5	52.5	29.5	29.8
3-A..	Fourdrinier kraft‡	0.0171	Semi-chemical	0.00985	48.4	46.0	26.2	25.2
4-A..	Fourdrinier kraft‡	0.0171	Chestnut	0.00834	46.1	45.4	26.2	24.6
7-B..	Fourdrinier kraft‡	0.0350	Semi-chemical	0.00985	64.0	67.6	59.6	60.6
8-B..	Fourdrinier kraft — jack pine (standard)	0.0155	Aspen	0.00728	41.8	41.2	34.3	33.5
9-B..	Fourdrinier kraft — jack pine (high density)	0.0126	Aspen	0.00728	54.2	52.3	42.0	38.4

*Values for use in calculations are included in Table I of Part I, Note No. 2.
†Water finish, one side.
‡Dry finish, both sides.

Literature Cited

(1) Kellicutt, K. Q., "Note No. 2, Compressive strength of paperboard — Part I," *Package Engineering*, 4 (1959), No. 3 Mar.), p. 76.

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CANADA: Sperry Gyroscope Ottawa Limited, Ottawa, Ontario, Canada

Corrugated fibreboard boxes for potatoes

(*Continued from Page 43*)

SUMMARY AND RECOMMENDATION

Based on the findings of this study, the following summary and recommendations were made:

A. All the boxes tested were adequate for shipping potatoes seven layers high in the car.

B. Loading methods are more important than box ventilation features as regards ventilation of potatoes.

C. In general, B-flute is better than A-flute. This is true with both "heavy" and "light" board. A-flute does appear satisfactory if combined with light (200-lb. test) board.

D. Light board is better than heavy board when using A-flute. In B-flute, either weight board is satisfactory.

E. We recommend that each box have some type ventilation holes, but not for the strength or ventilation of potatoes. We think each box should have holes, preferably in the top or top edges, for air escape or intake, and for easy closing or opening of boxes. Gap-flap openings are not recommended since this type opening cuts down on the horizontal rigidity of the box. Hand holes might be a convenient air-escape hole, but their convenience factor in box handling is overestimated.

Cost Consideration

Unless corrugated boxes can compete costwise with burlap, they probably will not be used extensively. At least they will not be used for shipping the bulk of potatoes now being shipped in burlap.

Using current box and burlap prices, it appears as though boxes cannot, at present, compete with burlap. Box prices in Idaho are now (Jan., 1959) about $0.42/cwt. This is for the two-piece telescope box used in the experiment. Burlap prices are about $0.14/cwt.

This difference of $0.28 must be made up in some other way. Bruising differences can make up some of it. No one knows for sure how much additional bruising occurs in burlap, relative to boxes, but we estimate that it is about $0.16/cwt. This brings our cost difference down to $0.12/cwt. ($0.28–$0.16 = $0.12).

It costs more to fill boxes than burlap (using present filling methods); so, a true cost comparison should include a figure for this labor; also for the costs of assembling boxes. This is estimated at $0.03/cwt. against boxes. **On the credit side for boxes, floor pads are not needed; also, they have a higher salvage value as grocer carry-out boxes.**

Our final figure is that boxes cost at least $0.10/cwt. more than burlap. A freight-rate decrease could easily put boxes in a firm competitive position with burlap. Western railroads are proposing a decrease in rates for cars loaded with larger minimum weights of boxed potatoes. Thus, it is quite possible that this rate decrease, if approved, will be all that is needed to shift the industry to boxes.

Whether corrugated boxes are adopted by the industry depends on:

1. whether boxes will be accepted by the potato packing industry,
2. whether receivers are willing to pay packers for what they save on bruised potatoes, and
3. whether a freight rate decrease for larger loads of boxed potatoes is approved.

This study has shown that 40 per cent larger loads of boxed potatoes are possible, and the future looks bright for corrugated fibreboard as a shipping container for potatoes. (*End*)

Cushioning of packaged items

(*Continued from Page 65*)

gy absorbed is a minimum. At this point the cushion thickness required for protection of the packaged item is at a minimum. Package design to minimize cushion thickness and consequently package cubage involves consideration of the minimum force/energy ratio in selection or use of the cushioning material.

Consider cost factor. It is very important to also consider cushioning material cost, since the most efficient material is usually more expensive. **A measure of cushion efficiency which includes the cost factor can be developed.**

The use of mathematical methods by packaging engineers in selection of the optimum cushioning material and determination of cushion thickness requirements is often limited because of lack of knowledge regarding the packaged item fragility. **A simple, practical procedure for cushioning material type and thickness selection is described for packaged items whose fragility is not known.** (*End*)

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Wright Machinery Co. 109

What we think

Management of packaging often takes the skill of a juggler

Keeping a perspective on and a balance of the four ingredients of (1) men, (2) materials, (3) machinery, and (4) methods is probably the hardest part of managing the packaging function. It pays to strive consciously to see these four keystones *as a balance* because it is so easy for any one of them to upset the managerial apple cart.

It doesn't matter whether one is operating a vast array of packaging lines in widely scattered plants (with a battalion of skilled help at hand) or is running a one-man show in a small factory—and with hardly anyone to be that second right arm. Basic principles are the same, and differences are of degree rather than kind.

Anticipate changes, be alert to disruptions

Our point is that the fellow who has to keep it all running will find his work a lot easier if he (1) is especially alert to things that can happen to rock the boat, and (2) takes time for a little pencil sketching to organize his own particular resources. We are all seeking a tool to help us keep up with our day's work and plan ahead for its challenges.

A focal point of difficulty is that progress is never planned. Occuring at varying rates of rapidity, changes and developments never happen with clock-like regularity. Further, these conditions vary from plant to plant and industry to industry. Another variable is the ever-changing landscape of management fads and current gimmicks. It may be hard for a packaging line foreman to believe that an executive vice president or even a president in a luxuriously paneled and upholstered office is seldom top dog in his own organization and must heed the thinking of others. But, however high a man is on the ladder, dominant but transitory forces usually gnaw at his heel.

Sometimes the R & D people are in the ascendancy and have sold management on the idea that the folks on the firing line ought to be able to produce and package whatever the white-coated experts have brought forth as the current bright spot of the company's constellation of products. In other areas the engineering and machinery experts are in the driver's seat. They tell both the laboratory teams and the operating departments that it's got to be thus and so. Anyone who doesn't think so might ask a luckless packaging man who has had to put up with "central engineering". Elsewhere the current emphasis may be on human relations. Some executives are so busy being enlightened that they lose sight of the fact that they are here to meld people, equipment and facilities into a practical, working relationship.

Whether a change or development is tangible, (a new packaging material) or intangible, (say, human relations) the fact is that the kaleidoscope is always a bit jerky and that one phase or another is out of balance with the total combination.

What you do to correct the imbalance is another thing. Sometimes it is a matter of getting people of the right background for particular jobs. Often the source of difficulty is the difference of viewpoint between so-called line and staff executives. Some experts have an interesting answer for this one: Pick men of line experience for staff jobs. A fellow who has gone through at least some of the chairs in the lodge of packaging line operation can ask questions more searchingly than one who has never coped with the vagaries of getting out the day's work.

Key to effectiveness: Getting right balance

We hear other experts say that the two main problems of packaging management at any level are (1) costs, and (2) recognition. Unquestionably the man or group desiring adequate recognition of packaging as a function must show consummate skill at practical cost reduction. The trouble is that some men who have produced unbelievable savings in dollars have fallen far short of their goal of adequate recognition.

Taking a look at some of those who have achieved both objectives, we find that their attainments rest on their knack of doing a better job than most people in keeping the balance of (1) men, (2) materials, (3) machinery, and (4) methods. Skill, first in balancing, and second in interpreting the balance to everyone else concerned, is the final arbiter and common denominator of successful packaging management.

Bruce Hoffman

Editor

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